



## California Sportfishing Protection Alliance

*"An Advocate for Fisheries, Habitat and Water Quality"*

3536 Rainier Avenue, Stockton, CA 95204

T: 209-464-5067, F: 209-464-1028, E: [deltakeep@aol.com](mailto:deltakeep@aol.com), W: [www.calsport.org](http://www.calsport.org)

8 October 2010

Mr. Ken Landau, Assistant Executive Officer  
Ms. Diana Messina, Supervising WRCE  
Mr. Jim Marshall, Sr. WRCE  
Ms. Kathy Harder, WRCE  
Regional Water Quality Control Board  
Central Valley Region  
11020 Sun Center Drive, Suite 200  
Rancho Cordova, CA 95670-6144

VIA: Electronic Submission  
Hardcopy if Requested

RE: Renewal of Waste Discharge Requirements (NPDES No. CA0077682) for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County

Dear Messrs. Landau, Marshall and Mesdames Messina and Harder:

The California Sportfishing Protection Alliance (CSPA) has reviewed the tentative Waste Discharge Requirements (NPDES No. CA0077682) for the Sacramento Regional Wastewater Treatment Plant (Permit) and respectfully submits the following comments.

CSPA requests status as a designated party for this proceeding. CSPA is a 501(c)(3) public benefit conservation and research organization established in 1983 for the purpose of conserving, restoring, and enhancing the state's water quality and fishery resources and their aquatic ecosystems and associated riparian habitats. CSPA has actively promoted the protection of water quality and fisheries throughout California before state and federal agencies, the State Legislature and Congress and regularly participates in administrative and judicial proceedings on behalf of its members to protect, enhance, and restore California's degraded water quality and fisheries. CSPA members reside, boat, fish and recreate in and along waterways throughout the Central Valley, including Sacramento County.

It is difficult to imagine a more problematic location for a major wastewater treatment plant outfall than a shallow outside bend of a relatively narrow river reach that is within the tidal prism and whose waters are classified as "impaired" for myriad pollutants and identified as "critical habitat" for numerous species listed pursuant to state and federal endangered species acts. Sensitive life stages of listed species are present near the outfall twelve months of the year and subject to multiple stressors. The river reach is a major water contact recreational area enjoyed by thousands of anglers and water enthusiasts. A major drinking water intake is located upstream, within the tidal prism, and a profusion of agricultural diversions are located downstream.



It is imperative that discharges of wastewater into this sensitive river reach in an estuary that is experiencing ecosystem collapse be subject to the most rigorous regulatory treatment standards. Inexplicably, for many years, Sacramento Regional's wastewater plant has been exempted from requirements routinely applied to other wastewater treatment facilities in the region.

We appreciate staff's acknowledgement of the serious impacts to beneficial uses that have resulted from Sacramento Regional's discharge of inadequately treated wastewater to the Sacramento River. Requirements to install adequate nitrification/de-nitrification facilities and remove pathogens to tertiary standards are welcome and long overdue. We are, however, deeply concerned that other permit requirements are insufficient to protect beneficial uses, contravene numerous regulations pertaining to NPDES permit issuance and fail to provide interim protection to a seriously degraded ecosystem.

The proposed Permit continues the recent Regional Board trend of discarding state and federal permitting regulations it finds inconvenient. For example, it illegally backslides from previous orders and violates explicit antidegradation requirements. It uses effluent hardness rather than ambient hardness, as required by federal regulations, thereby eliminating protective effluent limitations for metals, including copper, lead and zinc. It accepts proprietary models that have not been peer-reviewed and cannot be verified or calibrated in violation of accepted scientific principles and common sense. It ignores California Toxics Rule requirements mandating compliance with CTR standards by May 2010 and dismisses federal requirements that compliance schedules not exceed the five-year life of a permit. Consequently, the Permit allows degradation of this critical waterway to continue for another ten years. It disregards recent and EPA recommended criteria to protect aquatic life. It grants a mixing zone before conducting reasonable potential analyses, which allows continued mass loading of salts into an estuary impaired by salt. It is not protective of public health and food production because it establishes mixing zones in a source of drinking water for constituents that threaten human health. It ignores Basin Plan requirements to evaluate additive and synergistic interactions of pollutants that result in toxicity. It fails to require compliance with receiving water limits for toxicity for effluent that historically has been routinely toxic to aquatic life. And, despite the magnitude of fisheries degradation, it inexplicably continues to exempt the facility from Thermal Plan temperature requirements. Failure to comply with the letter and spirit of essential regulations governing the discharge of waste for a facility of this magnitude is inexcusable.

For too long, Sacramento Regional has externalized the adverse costs of wastewater treatment to a degraded environment. For too long, the citizens of Sacramento have enjoyed low utility bills subsidized by the degradation of public trust assets owned in common by all Californians. Discharging pollutants into waters of the nation is a privilege, not a right. It is time for Sacramento residents to pay their fair share for enjoying that privilege.

The following outlines our numerous concerns.

1. The proposed Permit, Finding P, page 11, regarding endangered species protection should be modified to state that the discharge of toxic constituents in toxic concentrations will continue for 10 years, which may result in the "taking" of endangered species.



2. The proposed Permit fails to list bis(2-ethylhexyl)phthalate in the Emergency Planning and Community Right to Know Act assessment.
3. Effluent Limitations for aluminum and specific conductivity (EC) are improperly regulated as an annual average contrary to Federal Regulations 40 CFR 122.45 (d)(2).
4. The proposed Permit fails to contain mass-based effluent limits as required by Federal Regulations 40 CFR 122.45(b).
5. The proposed Permit fails to contain an Effluent Limitation for aluminum in accordance with Federal Regulations 40 CFR 122.44, US EPA's interpretation of the regulation, and California Water Code, Section 13377.
6. The Central Valley Regional Water Board (Region 5) NPDES Permits establish Effluent Limitations for metals based on the hardness of the effluent and/or the downstream water and rarely use the ambient upstream receiving water hardness as required by Federal Regulations, the California Toxics Rule (CTR, 40 CFR 131.38(c)(4)).
7. The Regional Board failed to use the most current criteria for copper resulting in the proposed Permit containing an inadequate effluent limitation in accordance with 40 CFR 122.44.
8. The proposed Permit fails to contain a protective Effluent Limitation for copper in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).
9. The proposed Permit fails to contain an Effluent Limitation for lead in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).
10. The proposed Permit fails to contain an Effluent Limitation for zinc in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).
11. The proposed Permit fails to implement the requirements of the Basin Plan, *Implementation, Policy for Application of Water Quality Objectives* with regard to additive toxicity.
12. The proposed permit contains an inadequate reasonable potential by using incorrect statistical multipliers as required by Federal regulations, 40 CFR § 122.44(d)(1)(ii).
13. The proposed Permit contains a compliance time schedule "effective immediately and ending on 30 November 2020" to meet the discharge limitations for BOD, TSS, ammonia, coliform organisms, chlorine and chlorpyrifos that exceeds the requirements of the Basin Plan.
14. The proposed Permit fails to contain an adequate effluent limitation for electrical conductivity (EC) in violation of federal regulation 40 CFR 122.44.



15. The proposed Permit fails to contain an effluent limitation for total dissolved solids (TDS) in violation of federal regulation 40 CFR 122.44.
16. The proposed Permit fails to meet the preconditions necessary to exempt waste storage, treatment and disposal ponds from California Code of Regulations Title 27 and fails to implement the requirements of CCR Title 27.
17. The proposed Permit contains an allowance for a mixing zone that does not comply with the requirements of Federal Regulation 40 CFR Section 131.12 (a)(1) and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) or the Basin Plan.
18. The proposed Permit contains Effluent Limitations less stringent than the existing permit, contrary to the Antidegradation requirements of the Clean Water Act and Federal Regulations, 40 CFR 122.44 (l)(1).
19. The proposed Permit carries forth a Thermal Plan exemption that degrades the aquatic life beneficial use of the receiving stream, the Sacramento River.
20. The proposed Permit fails to assess compliance and require compliance with and the Receiving Water Limitation for Toxicity, which is based on the Basin Plan narrative toxicity water quality objective.
21. The Basis for the proposed nitrate Effluent Limitation is not presented in the Fact Sheet as required by 40 CFR 124.8.
22. The proposed Permit contains an inadequate antidegradation analysis that does not comply with the requirements of Section 101(a) of the Clean Water Act, Federal Regulations 40 CFR § 131.12, the State Board's Antidegradation Policy (Resolution 68-16) and California Water Code (CWC) Sections 13146 and 13247.
23. The proposed Permit does not contain enforceable Effluent Limitations for chronic toxicity and therefore does not comply with the Basin Plan, Federal Regulations, at 40 CFR 122.44 (d)(1)(i) and the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP).
24. It is improper to rely upon linked proprietary models that have not been peer-reviewed and that cannot be independently calibrated and verified.
25. Comments on Tentative NPDES Permitting Options.
26. There are a number of inaccuracies and deficiencies in the monitoring program.

Our detailed comments and recommendations follow.

1. **The proposed Permit, Finding P, page 11, regarding endangered species protection should be modified to state that the discharge of toxic constituents in toxic concentrations will continue for 10 years, which may result in the “taking” of endangered species.**

The Central Valley Regional Water Quality Control Board's proposed Permit shows that the Sacramento Regional County Sanitation District discharges toxic levels of ammonia (45 mg/l)—almost 20 times above the acutely toxic level (2.2 mg/l)—to the Sacramento River, then requires the toxic discharges be eliminated within ten years, and concludes there will be no impact to endangered species.



The proposed Permit, pages F-53 through 56, contains the following information regarding ammonia:

**“(a) WQO.** The NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the Sacramento-San Joaquin Delta has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Sacramento-San Joaquin Delta is well documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 8.5, as the Basin Plan objective for pH in the receiving stream is the range of 6.5 to 8.5. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.5 was used to derive the acute criterion. The resulting acute criterion is 2.14 mg/L. The maximum observed 30-day rolling average temperature and the maximum observed pH of the Sacramento River were used to calculate the 30-day CCC. The maximum observed 30-day average Sacramento River temperature was 72.5°F (22.5°C), for the rolling 30-day period ending 4 September 2001. The maximum observed Sacramento River pH value was 8.0 on 9 September 2000. Using a pH value of 8.0 and the worst-case temperature value of 72.5°F (22.5°C) on a rolling 30-day basis, the resulting 30-day CCC is 1.8 mg/L (as N). The 4-day average concentration is derived in accordance with the USEPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 1.8 mg/L (as N), the 4-day average concentration that should not be exceeded is 4.5 mg/L (as N).

**(b) RPA Results.** Untreated domestic wastewater contains ammonia. Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The Discharger does not currently use nitrification to remove ammonia from the waste stream. Ammonia is known to cause acute and/or chronic toxicity to aquatic organisms. Therefore, the discharge has reasonable potential to cause or contribute to an exceedance of the Basin Plan’s narrative toxicity objective in the receiving water.

**(c) Dilution Considerations.** As discussed in Section IV.C.2.d of the Fact Sheet, an allowance for chronic aquatic life dilution may be granted. However, based on the considerations below and discussed in more detail in Attachment K, no dilution has been allowed for ammonia. The Central Valley Water Board determines that Discharger must fully nitrify and denitrify its wastewater to reduce ammonia and nitrogen for the following reasons:



- (1) Recent studies suggest that ammonia at ambient concentrations in the Sacramento River, Delta and Suisun Bay may be acutely toxic to native *Pseudodiaptomus forbesi* (copepod).
- (2) A consensus of scientific experts concluded the SRWTP is a major source of ammonia to the Delta.
- (3) Recent studies provide evidence that ammonia from the SRWTP discharge is contributing to the inhibition nitrogen uptake by diatoms in Suisun Bay.
- (4) Ammonia along with the clam, *Corbula* and high turbidity are attributed to reducing diatom production and standing biomass in the Suisun Bay.
- (5) Downstream of the discharge point, ammonia may be a cause in the shift of the aquatic community from diatoms to smaller phytoplankton species that are less desirable as food species.
- (6) Regardless of whether ammonia is directly or indirectly contributing to the POD, ammonia is shown to affect adult *Pseudodiaptomus forbesi* reproduction at concentrations greater than or equal to 0.79 mg/L. And nauplii and juvenile *Pseudodiaptomus forbesi* are affected at ammonia concentrations greater to or equal 0.36 mg/L. These ammonia concentrations can be found downstream of the discharge. The beneficial use protection extends to all aquatic life and not limited to pelagic organisms.
- (7) USEPA expects to publish the 2009 Ammonia Criteria Update which includes more stringent ammonia criteria for freshwater mussels compared with criteria for salmonids in early 2012. Freshwater mussels reside in the Upper Sacramento River above and likely below the SRWTP discharge.
- (8) The Discharger's effluent contains ammonia and BOD at levels that use all the assimilative capacity for oxygen demanding substances in the Sacramento-San Joaquin Delta. This results in no assimilative capacity for other cities and communities to discharge oxygen demanding constituents, which is needed for them to grow despite the fact that most of these cities and communities are already implementing Best Practical Treatment and Control (BPTC) at their own facilities and SRWTP is not.
- (9) The Discharger's effluent contains nitrosoamines at levels that are greater than 100 times the primary MCL. Nitrosamines are disinfection byproducts that are created when wastewater effluent contains ammonia and is then disinfected with chlorine, which is the case at the SRWTP.



(10) The Discharger must fully comply with Resolution No. 68-16 that requires Best Practical Treatment and Control, which for this discharge includes nitrification and denitrification of their wastewater.

**(d) WQBELs.** The Central Valley Water Board calculates WQBELs in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, USEPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTAs corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the average monthly effluent limitation (AMEL) and the maximum daily effluent limitation (MDEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures. This Order contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 1.8  $\mu\text{g/L}$  and 2.2  $\mu\text{g/L}$ , respectively, based on the NAWQC ammonia criteria for aquatic toxicity with no dilution credit.

**(e) Plant Performance and Attainability.** Analysis of the effluent data shows that the MEC of 45 mg/L is greater than the applicable WQBELs. See Table F-20. Performance-based Effluent Limitations Statistics. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is not feasible and appears to put the Discharger in immediate non-compliance with the ammonia final effluent limitations. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. The Discharger submitted an infeasibility analysis dated August 2010. As discussed in section IV.E of this Fact Sheet, a compliance schedule has been included in this Order for ammonia.”

With regard to the endangered species act, the proposed Permit contains the following Finding:

**P. Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

The proposed Permit also allows that:

“V. Whole Effluent Toxicity Testing Requirements; Acute and chronic Toxicity Testing  
*Ammonia Toxicity* – The acute toxicity testing may be modified to eliminate ammonia-



related toxicity until 30 November 2020, at which time the Discharger shall be required to implement the test without modifications to eliminate ammonia toxicity.

The wastewater treatment plant discharges ammonia at levels measured as high as 45 mg/l (page F-56). The proposed Permit contains a final average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for ammonia of 1.8 ~~µg/L~~ mg/l and 2.2 ~~µg/L~~ mg/l, respectively, based on the NAWQC ammonia criteria for aquatic toxicity with no dilution credit. (note: we assume the Permit means milligrams rather than micrograms for ammonia) Clearly the current discharge is toxic and compliance with the proposed limitation for ammonia is not required until the end of 2020, ten additional years of toxic discharges.

In addition to toxic levels of ammonia the proposed Permit limits other toxic constituents such as copper. The proposed Permit, Compliance Summary, page F-8, shows the effluent discharge to the Sacramento River failed acute toxicity tests 6 times in 2008 and 9 times in 2009. The compliance summary did not state whether ammonia removal was done prior to the acute toxicity testing.

The proposed Permit clearly shows that the wastewater discharge from the Sacramento Regional Wastewater Treatment plant is toxic to aquatic life. The Sacramento River, within the Sacramento River delta is home to numerous endangered and threatened species. Within the 10 years the Regional Board is proposing to allow Sacramento Regional County Sanitation District to eliminate the toxic discharges, the impact to threatened and endangered species will be devastating to a waterbody already in significant decline. The proposed Permit should acknowledge the impacts to endangered and threatened species during the 10-years the Regional Board is allowing for Sacramento County to eliminate their toxic discharges to the Sacramento River.

The Order has been developed with federal funds and is issued pursuant to U.S. Environmental Protection Agency (EPA) authorization. Consequently, the Regional Board and/or EPA must enter into formal consultation with both the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the ESA. The discharge of toxicity and toxic pollutants by the Discharger is a violation of Section 9 of the ESA and requires an incidental take permit pursuant to Section 10 of the ESA. The Regional Board's issuance of an Order that authorizes and/or "causes" an illegal "take" is also a violation of Section 9 of the ESA. Consequently, both the Discharger and the Regional Board must secure incidental take permits from NMFS and USFWS.

## **2. The proposed Permit fails to list bis (2-ethylhexyl) phthalate in the Emergency Planning and Community Right to Know Act assessment.**

Section 13263.6(a) of the CWC, requires that *"the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or the Regional Water Board has established numeric water quality objectives, and*



*has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective”.*

The proposed Permit cites chromium and chromium compounds, copper and copper compounds, lead and lead compounds, styrene and zinc compounds but fails to cite bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate (DEHP) is reportable to the Toxic Release Inventory (TRI) under section 313 of the Emergency Planning and Community Right-to-know Act (EPCRA). A discussion in the Regional Board permits with regard to bis(2-ethylhexyl)phthalate and EPCRA could not be located.

**3. Effluent Limitations for aluminum and specific conductivity (EC) are improperly regulated as an annual average contrary to Federal Regulations 40 CFR 122.45 (d)(2).**

Federal Regulation 40 CFR 122.45 (d)(2) requires that permit for POTWs establish Effluent Limitations as average weekly and average monthly unless impracticable. ((d) *Continuous discharges*. For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as: (1) Maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works; and (2) Average weekly and average monthly discharge limitations for POTWs.). The proposed Permit establishes Effluent Limitations for aluminum and EC as an annual average contrary to the cited Federal Regulation.

The common dictionary meaning of impracticable is: incapable of being performed or accomplished. The Regional Board has converted applicable water quality standards in Table 6 to monthly, weekly and daily limitations. It is mathematically possible to convert the limitations for aluminum and EC to weekly and monthly limitations. Establishing the Effluent Limitations for aluminum and EC in accordance with the Federal Regulation is not impracticable, it can be accomplished.

Pages F-88 and 89 of the proposed permit explain that: *“For effluent limitations based on Secondary MCLs, this Order includes annual average effluent limitations. The Secondary MCLs are drinking water standards contained in Title 22 of the California Code of Regulations. Title 22 requires compliance with these standards on an annual average basis, when sampling at least quarterly. Since it is necessary to determine compliance on an annual average basis, it is impracticable to calculate average weekly and average monthly effluent limitations.”* The proposed Permit discussion has nothing to do with the practicability or impracticability of converting the limitations to weekly and monthly limits.

Title 22 requirements are not binding on the Regional Board; the Regional Board does not regulate domestic drinking water supplies. The Regional Board is however required to protect the instream municipal and domestic beneficial uses. Limiting these constituents to be regulated on an annual, average will allow for shorter term peaks well above the secondary MCLs directly impacting the numerous documented downstream domestic water users. While the Department of Public Health (DPH) may be required to develop longer term limitations; the Regional Board



is obligated to protect the instream beneficial uses continuously. The Regional Board has no authority to allow concentration peaks of pollutants above the drinking water MCLs. It is not unusual for receiving water criteria based on protecting the municipal use to be more protective than the drinking water MCLs; look to the case of trihalomethanes. Trihalomethanes are regulated in drinking water at 80 ug/l while the California Toxics Rule (CTR) contains limitations for individual trihalomethanes (chlorodibromomethane and dibromochloromethane) at a fraction of that value. With respect to aluminum and EC and the Secondary MCL; the proposed Permit contains a Receiving Water Limitation, No 14 for Taste and Odors which requires that the discharge not cause taste- or odor-producing substances to be present in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses. There is no time frame associated with the Receiving Water Limitation and short term exceedences of the MCLs based on taste and odor could cause violation. In any case, the discussion of Title 22 requirements does not relieve the Regional Board from implementing 40 CFR 122.45 and converting the limitations to weekly and monthly which is possible, practicable and is required.

Even if Title 22 were applicable here, the state regulation does not override federal law. As the Regional Board states in their permit – the state can be more stringent than required by federal regulation but there is no such citation or allowance to be less stringent. Annual average limitations are less stringent than allowed under the 40 CFR 122.45. The permit must be amended to limit aluminum and EC in accordance with the cited Federal Regulation.

It is also noted that the proposed Permit, pages F-44 and 67, discusses annual average limitations for MTBE although limited in Table 6 as a daily maximum. The above discussion would also apply to MTBE should the currently proposed limitation be modified.

**4. The proposed Permit fails to contain mass-based effluent limits as required by Federal Regulations 40 CFR 122.45(b).**

Federal Regulation, 40 CFR 122.45 (b) requires that in the case of POTWs, permit Effluent Limitations, standards, or prohibitions shall be based on design flow. Concentration is not a basis for design flow. Mass limitations are concentration multiplied by the design flow and therefore meet the regulatory requirement. Each of the constituents regulated in the proposed Permit, Table 6, with the exception of BOD, TSS and ammonia do not have mass based limitations.

Section 5.7.1 of U.S. EPA's *Technical Support Document for Water Quality Based Toxics Control* (TSD, EPA/505/2-90-001) states with regard to mass-based Effluent Limits:

“Mass-based effluent limits are required by NPDES regulations at 40 CFR 122.45(f). The regulation requires that all pollutants limited in NPDES permits have limits, standards, or prohibitions expressed in terms of mass with three exceptions, including one for pollutants that cannot be expressed appropriately by mass. Examples of such pollutants are pH, temperature, radiation, and whole effluent toxicity. Mass limitations in terms of pounds per day or kilograms per day can be calculated for all chemical-specific toxics such as chlorine or chromium. Mass-based limits should be calculated using concentration limits at critical



flows. For example, a permit limit of 10 mg/l of cadmium discharged at an average rate of 1 million gallons per day also would contain a limit of 38 kilograms/day of cadmium.

Mass based limits are particularly important for control of bioconcentratable pollutants. Concentration based limits will not adequately control discharges of these pollutants if the effluent concentrations are below detection levels. For these pollutants, controlling mass loadings to the receiving water is critical for preventing adverse environmental impacts.

However, mass-based effluent limits alone may not assure attainment of water quality standards in waters with low dilution. In these waters, the quantity of effluent discharged has a strong effect on the instream dilution and therefore upon the RWC. At the extreme case of a stream that is 100 percent effluent, it is the effluent concentration rather than the mass discharge that dictates the instream concentration. Therefore, EPA recommends that permit limits on both mass and concentration be specified for effluents discharging into waters with less than 100 fold dilution to ensure attainment of water quality standards.”

Federal Regulations, 40 CFR 122.45 (f), states the following with regard to mass limitations:

- “(1) all pollutants limited in permits shall have limitations, standards, or prohibitions expressed in terms of mass except:
  - (i) For pH, temperature, radiation or other pollutants which cannot be expressed by mass;
  - (ii) When applicable standards and limitations are expressed in terms of other units of measurement; or
  - (iii) If in establishing permit limitations on a case-by-case basis under 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation (for example, discharges of TSS from certain mining operations), and permit conditions ensure that dilution will not be used as a substitute for treatment.
- (2) Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations.”

Federal Regulations, 40 CFR 122.45 (B)(1), states the following: “In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow.” For POTWs, priority pollutants such as metals have traditionally been reduced by the reduction of solids from the wastestream, incidental to treatment for organic material. Following adoption of the CTR, compliance with priority pollutants is of critical importance and systems need to begin utilizing loading rates of individual constituents in the WWTP design process. It is highly likely that the principal design parameters for individual priority pollutant removal are based on mass, making mass based Effluent Limitations critically important to compliance. The inclusion of mass limitations is of critical importance to achieving compliance with requirements for individual pollutants. The proposed Permit contains a long list of priority pollutants, Table 6, for



which there is no identified design flow. The proposed Permit does not comply with the requirements of 40 CFR 122.45.

In addition to the above citations, on June 26<sup>th</sup> 2006 U.S. EPA, Mr. Douglas Eberhardt, Chief of the CWA Standards and Permits Office, sent a letter to Dave Carlson at the Central Valley Regional Water Quality Control Board strongly recommending that NPDES permit effluent limitations be expressed in terms of mass as well as concentration.

**5. The proposed Permit fails to contain an Effluent Limitation for aluminum in accordance with Federal Regulations 40 CFR 122.44, US EPA's interpretation of the regulation, and California Water Code, Section 13377.**

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." The Basin Plan contains a narrative water quality objective for toxicity that states in part that "[a]ll waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life" (narrative toxicity objective). Where numeric water quality objectives have not been established, 40 CFR §122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a), proposed State criteria or a State policy interpreting narrative criteria supplemented with other relevant information, or an indicator parameter. U.S. EPA developed National Recommended Ambient Water Quality Criteria for protection of freshwater aquatic life for aluminum to prevent toxicity to freshwater aquatic life. The recommended ambient criteria four-day average (chronic) and one-hour average (acute) criteria for aluminum are 87 ug/l and 750 ug/l, respectively.

US EPA's 87 ug/l chronic criterion was developed using low pH and hardness testing. California Central Valley waters, the Sacramento River, at the Valley floor, have been sampled to have hardnesses as low as 26 mg/l CaCO<sub>3</sub> as reported in the proposed Permit. US EPA recognized in their ambient criteria development document, (Ambient Water Quality Criteria for Aluminum, EPA 440/5-86-008) that the pH was in the range 6.5 to 6.6 and that the hardness was below 20 mg/l. Typical values for pH and hardness in the Central Valley alone warrant use of the chronic ambient criteria for aluminum. Despite the hardness and pH values used in the development of the criteria; U.S. EPA's conclusions in their *Ambient Criteria for the Protection of Freshwater Aquatic Life* recommends that application of the ambient criteria as necessary to be protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria.

Supporting the use and applicability of the ambient criteria for aluminum US EPA recently wrote the following letter to the Regional Board:





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION IX**

**75 Hawthorne Street  
San Francisco, CA 94105-3901**

Certified Mail No. 7008 3230 0000 3862 9328  
Return Receipt Requested

**JUN 24 2010**

Pamela Creedon  
Executive Officer  
Central Valley Regional Water Quality Control Board  
11020 Sun Center Drive, Suite 200  
Rancho Cordova, CA 95670

Re: Water Quality Criteria for Aluminum and the Placer County Sewer Maintenance  
District 1 WWTP (NPDES Permit No. CA0079316)

Dear Ms. Creedon:

We have reviewed Placer County Department of Facility Services' request, dated June 14, 2010, to relax the aluminum effluent limitations in the proposed NPDES permit. Relaxing the effluent limitations may degrade water quality, adversely affect beneficial uses, and conflict with federal anti-backsliding and/or anti-degradation requirements. These concerns need to be addressed to ensure the permit effectively protects water quality and complies with NPDES permitting requirements.

At its May 27, 2010 meeting, the Central Valley Regional Water Quality Control Board considered a proposed renewal of the NPDES permit for the Placer County Sewer Maintenance District 1 wastewater treatment plant. During the meeting, the discharger contested the applicability of EPA's National Recommended Water Quality Criteria for aluminum in determining reasonable potential for the discharge to exceed water quality standards and establishing effluent limitations. The discharger contested the use of the chronic aluminum criterion for protection of aquatic life since the criterion is based on a lower hardness than observed in the receiving waters. The 87 µg/l chronic aluminum criterion is based on a toxicity test with striped bass in water at pH between 6.5 and 6.6 standard units and hardness less than 10 mg/l.

The aluminum effluent limitations in the proposed permit were calculated by applying EPA-recommended aluminum criteria as an interpretation of the narrative toxicity standard in the Basin Plan. The effluent limitations were calculated in accordance with procedures described in the State Implementation Policy. The EPA criteria for aluminum were also applied to the existing permit for this facility to establish the average monthly and maximum daily effluent limitations.

We understand that the existing maximum daily effluent limitation has been met (with one exception) and the 30-day average effluent limitation has been met approximately 16 months out of 25 from 2006 to 2009. The discharger currently manipulates hardness in the effluent by adding magnesium hydroxide to provide



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alkalinity for the nitrification process. Based on data the discharger provided, the upstream receiving water hardness in Rock Creek ranges from 20 to 98 mg/l, but the lowest observed effluent hardness is 141 mg/l. We understand that the reported lowest ambient hardness values (20 mg/l) may actually be a detection limit as that specific value was reported in six consecutive samples taken in 2007. If future modification to the treatment process discontinues or reduces the use of magnesium hydroxide, the effluent hardness may be significantly reduced.


EPA has not formally changed its recommended aluminum criteria; the appropriate aluminum criteria values for higher hardness situations remain uncertain. The existing EPA-recommended chronic aluminum criterion of 87 µg/l is clearly protective of aquatic life and is appropriate for use in evaluating reasonable potential and establishing effluent limitations. As EPA's Charles Delos notes in his 2002 and 2010 letters, it may be reasonable to apply a higher criterion value if the ambient hardness levels are substantially and consistently higher than the values used in deriving the existing chronic criterion value. When considering whether to apply a higher criterion value, the Regional Board should carefully consider whether the high ambient and effluent hardness values asserted by the discharger are accurate and likely to continue in the future.

The Regional Board has discretion in interpreting the Basin Plan narrative toxicity standard and it may be possible to make a different reasonable potential conclusion or derive less stringent effluent limitations than provided in the existing permit. However, a decision to apply a higher criterion and relax or eliminate the effluent limitations imposed by the previous permit would have to be supported by thorough anti-degradation and anti-backsliding analyses. Recent data show that effluent concentrations of aluminum ranged between 12 and 162 µg/l. A decision to eliminate or raise the aluminum effluent limitations above current performance levels would trigger serious anti-degradation and anti-backsliding concerns as that action would, in effect, authorize aluminum discharges above current discharge and ambient levels. The information from Mr. Delos provided by the discharger does not constitute "new information" that provides a basis for backsliding from existing permit limitations as we understand that information was initially provided to Regional Board staff in 2002, prior to issuance of the existing permit.

Given the uncertainty about appropriate aluminum criteria levels for this situation and the need to carefully evaluate anti-degradation and anti-backsliding implications of removing or relaxing the aluminum limitations, EPA Region IX recommends the conservative approach of retaining the existing effluent limitations in the new permit.

If you wish to discuss our recommendations, please contact Elizabeth Sablad of my staff at (415) 972-3044.

Sincerely,

 24 June 2010  
Alexis Strauss, Director  
Water Division



The Regional Board and their proposed Permit cites US EPA's *Ambient Criteria for the Protection of Freshwater Aquatic Life for Aluminum* (criteria) as not being representative or necessary because the chronic criteria were based on a low hardness and low pH. The Regional Board cites one section of the criteria development document but ignores the final recommendation to use the recommended criteria absent a site-specific objective for aluminum. The Regional Board then defaults to the US EPA recommended acute criteria of 750 ug/l. The Regional Board's citation of the criteria development document is incomplete its review, for example the *criteria* development document (EPA 440/5-86-008) also cites that:

169 ug/l of aluminum caused a 24% reduction in the growth of young brook trout.

174 ug/l of aluminum killed 58% of the exposed striped bass.

Bioaccumulation factors ranged from 50 to 231 for young brook trout exposed to aluminum for 15 days.

Aluminum at 169 ug/l caused a 24% reduction in the weight of young brook trout.

US EPA recommends that understanding the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* is necessary in order to understand the text, tables and calculations of a criteria document. The Regional Board's assessment of the use of low hardness and low pH clearly shows they did not heed EPA's advice in reviewing the criteria development procedures for water quality criteria or the final recommendations. The Regional Board occasionally cites individual aluminum toxicity testing at Yuba City; again individual testing is not a valid replacement for developing fully protective criteria. A prime example of a state utilizing good water quality standards development techniques for developing a site specific standard for aluminum is the state of Indiana where a final chronic criterion of 174 ug/l was established in 1997. In 2003, Canada adopted pH dependant freshwater aquatic life criteria for aluminum that ranges from 84 ug/l to 252 ug/l. Ignoring the final recommendation of the criteria misses the protective intermediate measures to protect against mortality and reductions to growth and reproduction. According to the New Mexico water quality standards (20.6.4.900.M NMAC), the dissolved aluminum chronic criterion is 87 µg/L and the dissolved aluminum acute criterion is 750 µg/L for aquatic life uses. High chronic levels of dissolved aluminum can be toxic to fish, benthic invertebrates, and some single-celled plants. Aluminum concentrations from 100 to 300 ug/L increase mortality, retard growth, gonadal development and egg production of fish (<http://h2osparc.wq.ncsu.edu>). The Regional Board's single use of the acute criteria for aluminum is not protective of the aquatic life beneficial uses of the receiving stream.

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." US EPA has interpreted 40 CFR 122.44(d) in *Central Tenets of the National Pollutant Discharge Elimination System (NPDES) Permitting Program* (Factsheets and Outreach Materials, 08/16/2002) that although States will likely have unique implementation policies there are certain tenets that may not be waived by State procedures. These tenets include that "where valid, reliable, and representative effluent data or instream background data are available they MUST be used in applicable reasonable potential and limits



derivation calculations. Data may not be arbitrarily discarded or ignored.” The California Water Code (CWC), Section 13377 states in part that: “...the state board or the regional boards shall...issue waste discharge requirements... which apply and ensure compliance with ...water quality control plans, or for the protection of beneficial uses...” Section 122.44(d) of 40 CFR requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. A water quality standard for Failure to include an effluent limitation for aluminum in the proposed permit violates 40 CFR 122.44 and CWC 13377.

The proposed Permit with regard to aluminum and failing to implement the chronic criteria specifically states on pages F-52 and 53 that:

**“i. Aluminum, (a) WQO.** The Secondary MCL for aluminum for the protection of the MUN beneficial use is 200 µg/L. In addition, USEPA developed National Recommended Ambient Water Quality Criteria (NAWQC) for protection of freshwater aquatic life for aluminum. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for aluminum are 87 µg/L and 750 µg/L, respectively, for waters with a pH of 6.5 to 9.0. USEPA recommends that the ambient criteria are protective of the aquatic beneficial uses of receiving waters in lieu of site-specific criteria. However, information contained in the footnotes to the NAWQC indicate that the development of the chronic criterion was based on specific receiving water conditions where there is low pH (below 6.5) and low hardness levels (below 50 mg/L as CaCO<sub>3</sub>). The Sacramento River (SR) has been measured to have hardness values—typically between 26 and 100 mg/L as CaCO<sub>3</sub>. The SR has been measured above the discharge to have a pH between 6.4 to 8.8. Thus, it is unlikely that application of the chronic criterion of 87 µg/L is necessary to protect aquatic life in the Sacramento River in the vicinity of the discharge. For similar reasons, the Utah Department of Environmental Quality (Department) only applies the 87 µg/L chronic criterion for aluminum where the pH is less than 7.0 and the hardness is less than 50 mg/L as CaCO<sub>3</sub> the receiving water after mixing. For conditions where the pH equals or exceeds 7.0 and the hardness is equal to or exceeds 50 mg/L as CaCO<sub>3</sub>, the Department regulates aluminum based on the 750 µg/L acute criterion. In this site specific case it is likely that application of the stringent chronic criteria (87µg/L) is overly protective.”

The legally adopted site-specific aluminum criteria in Utah found in the Utah Administrative Code <http://www.rules.utah.gov/publicat/code/r317/r317-002.htm#T16>. Actually states that the criteria for aluminum is

Aluminum, 4 Day Average (6) 87, 1 Hour Average 750

(6) The criterion for aluminum will be implemented as follows: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO<sub>3</sub> in the receiving water after mixing, the 87 ug/l chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/l acute aluminum criterion (expressed as total recoverable).



Even if one were to properly apply the Utah objective; since the hardness in the Sacramento River is below 50 mg/l (measured at 26mg/l), the 87 ug/l chronic criteria would be applicable. Perhaps the Regional Board staff has misread their cited Utah footnote; if the hardness is greater than 50 mg/l – the 87 ug/l will not apply. Here the hardness has been shown to be less than 50 so the 87 ug/l criteria would apply. Of course the Utah objective is not applicable in California.

More importantly with regard to Utah is that they legally adopted a state specific criterion. The Regional Board in this case is attempting to utilize the Utah objective and fails to pursue a technically, factually and legally adequate site-specific objective for aluminum.

40 CFR 122.44 (d)(vi):

“Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options:

- (A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or
- (B) Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where necessary by other relevant information; or
- (C) Establish effluent limitations on an indicator parameter for the pollutant of concern, provided:
  - (1) The permit identifies which pollutants are intended to be controlled by the use of the effluent limitation;
  - (2) The fact sheet required by Sec. 124.56 sets forth the basis for the limit, including a finding that compliance with the effluent limit on the indicator parameter will result in controls on the pollutant of concern which are sufficient to attain and maintain applicable water quality standards;



- (3) The permit requires all effluent and ambient monitoring necessary to show that during the term of the permit the limit on the indicator parameter continues to attain and maintain applicable water quality standards; and
- (4) The permit contains a reopener clause allowing the permitting authority to modify or revoke and reissue the permit if the limits on the indicator parameter no longer attain and maintain applicable water quality standards.”

California has not established water quality criteria for aluminum.

Federal Regulations allow a state to be more stringent than federal regulations, but there are no provisions for a state to be less stringent than applicable regulations. The Regional Board’s failure to include effluent limitations for aluminum, based on EPA’s chronic water quality criteria, is less stringent than the limitations required pursuant to 122.44(d)(vi). The Regional Board could adopt site-specific criteria or ask the State Board to adopt a water quality criterion.

The Regional Board’s use of the “Utah” criteria for developing limitations, or for failing to develop limitation, utilizes the criteria to justify less restrictive site-specific water quality objectives. The Regional Board has utilized the “Utah” criteria as a replacement for legally adopted aluminum water quality criteria.

40 CFR 131.2 - A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act).

40 CFR 131.3 (c) *Section 304(a) criteria* are developed by EPA under authority of section 304(a) of the Act based on the latest scientific information on the relationship that the effect of a constituent concentration has on particular aquatic species and/or human health. This information is issued periodically to the States as guidance for use in developing criteria.

The establishment of state wide or site specific water quality criteria must be done in accordance with 40 CFR 131. Such criteria must be submitted to EPA for review and approval:

“The following elements must be included in each State’s water quality standards submitted to EPA for review:

- (a) Use designations consistent with the provisions of sections 101(a)(2) and 303(c)(2) of the Act.
- (b) Methods used and analyses conducted to support water quality standards revisions.
- (c) Water quality criteria sufficient to protect the designated uses.
- (d) An antidegradation policy consistent with § 131.12.



- (e) Certification by the State Attorney General or other appropriate legal authority within the State that the water quality standards were duly adopted pursuant to State law.
- (f) General information which will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include the uses specified in section 101(a)(2) of the Act as well as information on general policies applicable to State standards which may affect their application and implementation.”

The Regional Board has not however recalculated the criteria and begun the legally required process of modifying the water quality criteria. The Regional Board has circumvented the legal water quality standards development process and applied the recommended water quality levels for Utah in NPDES permits. This conflicts with federal and state requirements for developing water quality standards, including site-specific standards. The Regional Board has failed to follow the legally required procedures for developing water quality standards, 40 CFR Part 131. In utilizing the Utah criteria in place of legally adopted criteria the Regional Board has failed to comply with the California Water Code, Porter Cologne Section 13241. In applying a new water quality standard for aluminum from the State of Utah and failing to abide by US EPA’s ambient criteria for aluminum the Regional Board failed to consider the factors from Porter Cologne § 13241. Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

- (a) Past, present, and probable future beneficial uses of water.
- (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
- (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors, which affect water quality in the area.
- (d) Economic considerations.
- (e) The need for developing housing within the region.
- (f) The need to develop and use recycled water.

**6. The Central Valley Regional Water Board (Region 5) NPDES Permits establish Effluent Limitations for metals based on the hardness of the effluent and/or the downstream water and rarely use the ambient upstream receiving water hardness as required by Federal Regulations, the California Toxics Rule (CTR, 40 CFR 131.38(c)(4)).**

For the Sac Regional discharge the upstream receiving water always at the lowest observed upstream receiving water hardness (i.e., 26 mg/L as CaCO<sub>3</sub>). The Water-Quality Assessment of the Sacramento River Basin, California Water-Quality, Sediment and Tissue Chemistry, and Biological Data, 1995-1998 (Open-File Report 2000- 91) by the United States Geological Survey found the total hardness of the Sacramento River at Freeport to be 19 mg/l as CaCO<sub>3</sub> on 6 January 1997 ([http://ca.water.usgs.gov/sac\\_nawqa/Publications/ofr\\_2000-](http://ca.water.usgs.gov/sac_nawqa/Publications/ofr_2000-)



[391/data\\_sw/Freeport/freefld.html](http://391/data_sw/Freeport/freefld.html)). The USGS is a reliable source of information and there is no reason not to use the lowest reported hardness of 19 mg/l. The data is at least as reliable as that reported by the Discharger and utilized by the Regional Board. However, for ease of calculation and for demonstration purposes the following uses the 26 mg/l hardness low data point reported in the proposed Permit. For any modification of the proposed Permit; a low ambient instream hardness should be established at 19 mg/l.

The Regional Board used a hardness of 80 mg/L (as CaCO<sub>3</sub>) to calculate the effluent concentration allowance (ECA) for Concave Down Metals (chronic cadmium, chromium III, copper, nickel, and zinc) rationalizing that an ECA based on a lower hardness (e.g. lowest upstream receiving water hardness) would also be protective, but would result in unreasonably stringent effluent limits considering the known conditions. Therefore, in this Order the ECA for all Concave Down Metals has been calculated using Equation 1 with a hardness of 80 mg/L (as CaCO<sub>3</sub>). (Permit pages F-23 and 24)

The Regional Board used the minimum upstream receiving water hardness and the minimum effluent hardness to calculate the ECA for all Concave Up Metals (acute cadmium, lead, and acute silver) rationalizing that the use of a lower ECA (e.g., calculated based solely on the lowest upstream receiving water hardness) is also protective, but would lead to unreasonably stringent effluent limits considering the known conditions.

Metals	Regional Board's Effluent Concentration Allowances, ECAs (ug/L) as total recoverable metals		Using a hardness of 26 mg/l*	
	acute	chronic	acute	chronic
Copper	11	7.7	3.9	3.0
Chromium III	1500	72	565	68
Cadmium	3.3	2.1	0.96	0.85
Lead	54	2.1	15	0.55
Nickel	390	43	155	17
Silver	1.8	--	0.37 (daily max)	
Zinc	99	99	38	38

\*19 mg/l total hardness was reported by USGS for the Sacramento River at Freeport.

It is obvious from the table above that using the ambient upstream hardness results in significantly more restrictive effluent limitations and that more constituents are likely to present a reasonable potential to exceed the criteria.

The proposed Permit cites in Findings F and G that federal regulations require the application of limitations more stringent than technological standards where necessary to meet water quality standards. The Regional Board has failed to cite any regulatory authority that allows limitations that are less stringent than those required by federal regulation.

Federal Regulation 40 CFR 131.38(c)(4) states that: "For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters



with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations.” (Emphasis added). The definition of *ambient* is “in the surrounding area”, “encompassing on all sides”. It has been the Region 5, Sacramento, NPDES Section, in referring to Basin Plan objectives for temperature, to define *ambient* as meaning upstream. It is reasonable to assume, after considering the definition of ambient, that EPA is referring to the hardness of the receiving stream before it is potentially impacted by an effluent discharge. It is also reasonable to make this assumption based on past interpretations and since EPA, in permit writers’ guidance and other reference documents, generally assumes receiving streams have dilution, which would ultimately “encompass” the discharge. Ambient conditions are in-stream conditions unimpacted by the discharge. Confirming this definition, the SIP Sections 1.4.3.1 *Ambient Background Concentration as an Observed Maximum* and 1.4.3.2 state in part that: “If possible, preference should be given to ambient water column concentrations measured immediately upstream or near the discharge, but not within an allowed mixing zone for the discharge. The RWQCB shall have discretion to consider if any samples are invalid for use as applicable data due to evidence that the sample has been erroneously reported or the sample is not representative of the ambient receiving water column that will mix with the discharge.”

The Regional Board has used the effluent hardness and the instream effluent hardness measured immediately downstream of the point of discharge, calling such “ambient”. Ambient is defined as “surrounding”; not “in the middle of”. Regional Board staff have begun to define any hardness used (effluent, upstream and downstream) as being “ambient”. The result of using a higher effluent or downstream hardness value is that metals are toxic at higher concentrations, discharges have less reasonable potential to exceed water quality standards and the resulting Permits have fewer Effluent Limitations.

The most typical wastewater discharge situation is where the receiving water hardness is lower than the effluent hardness. Metals are more toxic in lower hardness water. For example; if the receiving water hardness is 25 mg/l and the effluent hardness is 50 mg/l a corresponding chronic discharge limitation for copper based on the different hardness’s would be 2.9 ug/l and 5.2 ug/l, respectively. Obviously, the limitation based on the true ambient (upstream) receiving water hardness is more restrictive.

The Regional Board’s use of hardness other than the upstream is based on an approach developed by Dr. Robert Emerick, of Eco:Logic Engineers. Dr. Emerick developed a different approach for evaluating hardness-dependent metals that used effluent and downstream hardness values in assessing reasonable potential and developing effluent limits. He subsequently presented his approach at the Water Board’s Training Academy and the Regional Board has adopted this methodology as a defacto policy in developing and issuing wastewater discharge permits. Dr. Emerick’s approach has never been evaluated or adopted through the legally mandated rule-making procedures. Use of the policy has resulted in fewer and less stringent and less protective limits in numerous permits.

Federal Regulation 40 CFR 131.38(c)(4) states that: “For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the



surface water shall be used in those equations.” (Emphasis added). The “Emerick” method employs the use of the effluent hardness to calculate hardness dependant metals criteria. The effluent is not surface water as required by 40 CFR 131.38(c)(4) and therefore the “Emerick” method cannot be used in determining reasonable potential or establishing aquatic life criteria for hardness dependant metals.

The Federal Register, Volume 65, No. 97/Thursday, May 18th 2000 (31692), adopting the California Toxics Rule in confirming that the ambient hardness is the upstream hardness, absent the wastewater discharge, states that: “A hardness equation is most accurate when the relationship between hardness and the other important inorganic constituents, notably alkalinity and pH, are nearly identical in all of the dilution waters used in the toxicity tests and in the surface waters to which the equation is to be applied. If an effluent raises hardness but not alkalinity and/or pH, using the lower hardness of the downstream hardness might provide a lower level of protection than intended by the 1985 guidelines. If it appears that an effluent causes hardness to be inconsistent with alkalinity and/or pH the intended level of protection will usually be maintained or exceeded if either (1) data are available to demonstrate that alkalinity and/or pH do not affect the toxicity of the metal, or (2) the hardness used in the hardness equation is the hardness of upstream water that does not include the effluent. The level of protection intended by the 1985 guidelines can also be provided by using the WER procedure.”

On March 24, 2000 the US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) issued a biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The biological opinion was issued to the U.S. Environmental Protection Agency, Region 9, with regard to the “Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California” (CTR)”. The document represented the Services’ final biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act).

The biological opinion contains the following discussion, beginning on page 205, regarding the use of hardness in developing limitations for toxic metals:

“The CTR should more clearly identify what is actually to be measured in a site water to determine a site-specific hardness value. Is the measure of hardness referred to in the CTR equations a measure of the water hardness due to calcium and magnesium ions only? If hardness computations were specified to be derived from data obtained in site water calcium and magnesium determinations alone, confusion could be avoided and more accurate results obtained (APHA 1985). Site hardness values would thus not include contributions from other multivalent cations (e.g., iron, aluminum, manganese), would not rise above calcium + magnesium hardness values, or result in greater-than-intended site criteria when used in formulas. In this Biological opinion, what the Services refer to as hardness is the water hardness due to calcium + magnesium ions only.



The CTR should clearly state that to obtain a site hardness value, samples should be collected upstream of the effluent source(s). Clearly stating this requirement in the CTR would avoid the computation of greater-than-intended site criteria in cases where samples were collected downstream of effluents that raise ambient hardness, but not other important water qualities that affect metal toxicity (e.g., pH, alkalinity, dissolved organic carbon, calcium, sodium, chloride, etc.). Clearly, it is inappropriate to use downstream site water quality variables for input into criteria formulas because they may be greatly altered by the effluent under regulation. Alterations in receiving water chemistry by a discharger (e.g., abrupt elevation of hardness, changes in pH, exhaustion of alkalinity, abrupt increases in organic matter etc.) should not result, through application of hardness in criteria formulas, in increased allowable discharges of toxic metals. If the use of downstream site water quality variables were allowed, discharges that alter the existing, naturally-occurring water composition would be encouraged rather than discouraged. Discharges should not change water chemistry even if the alterations do not result in toxicity, because the aquatic communities present in a water body may prefer the unaltered environment over the discharge-affected environment. Biological criteria may be necessary to detect adverse ecological effects downstream of discharges, whether or not toxicity is expressed.

The CTR proposes criteria formulas that use site water hardness as the only input variable. In contrast, over twenty years ago Howarth and Sprague (1978) cautioned against a broad use of water hardness as a “shorthand” for water qualities that affect copper toxicity. In that study, they observed a clear effect of pH in addition to hardness. Since that time, several studies of the toxicity of metals in test waters of various compositions have been performed and the results do not confer a singular role to hardness in ameliorating metals toxicity. In recognition of this fact, most current studies carefully vary test water characteristics like pH, calcium, alkalinity, dissolved organic carbon, chloride, sodium, suspended solid s, and others while observing the responses of test organisms. It is likely that understanding metal toxicity in waters of various chemical makeups is not possible without the use of a geochemical model that is more elaborate than a regression formula. It may also be that simple toxicity tests (using mortality, growth, or reproductive endpoints) are not capable of discriminating the role of hardness or other water chemistry characteristics in modulating metals toxicity (Erickson *et al.* 1996). Gill surface interaction models have provided a useful framework for the study of acute metals toxicity in fish (Pagenkopf 1983; Playle *et al.* 1992; Playle *et al.* 1993a; Playle *et al.* 1993b; Janes and Playle 1995; Playle 1998), as have studies that observe physiological (e.g. ion fluxes) or biochemical (e.g. enzyme inhibition) responses (Lauren and McDonald 1986; Lauren and McDonald 1987a; Lauren and McDonald 1987b; Reid and McDonald 1988; Verbost *et al.* 1989; Bury *et al.* 1999a; Bury *et al.* 1999b). Even the earliest gill models accounted for the effects of pH on metal speciation and the effects of alkalinity on inorganic complexation, in addition to the competitive effects due to hardness ions (Pagenkopf 1983). Current gill models make use of sophisticated, computer-based, geochemical programs to more accurately account for modulating effects in waters of different chemical makeup (Playle 1998). These programs have aided in the interpretation of physiological or biochemical responses in fish and i n



investigations that combine their measurement with gill metal burdens and traditional toxicity endpoints.

The Services recognize and acknowledge that hardness of water and the hardness acclimation status of a fish will modify toxicity and toxic response. However the use of hardness alone as a universal surrogate for all water quality parameters that may modify toxicity, while perhaps convenient, will clearly leave gaps in protection when hardness does not correlate with other water quality parameters such as DOC, pH, Cl- or alkalinity and will not provide the combination of comprehensive protection and site specificity that a multivariate water quality model could provide. In our review of the best available scientific literature the Services have found no conclusive evidence that water hardness, by itself, in either laboratory or natural water, is a consistent, accurate predictor of the aquatic toxicity of all metals in all conditions.

SWRCB presidential Order No. WQ 2008-0008 (Corrected) regarding a petition for consideration of the City of Davis' NPDES Permit states and concludes that:

“Based on the current record, it would be more appropriate to use the lowest reliable upstream receiving water hardness values of 78 mg/l for Willows Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain for protection from acute toxicity impacts, regardless of when the samples were taken or whether they were influenced by storm events. Because high flow conditions may deviate from the design flow conditions for selection of hardness as specified in the CTR, it may not be necessary, in some circumstances, to select the lowest hardness values from high flow or storm event conditions. Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions.”

**“Conclusion:** The Central Valley Water Board was justified in using upstream receiving water hardness values rather than effluent hardness values. However, for protection from acute toxicity impacts in the receiving waters, which can occur in short durations even during storm events, in this case, based on the existing record, the Central Valley Water Board should have used the lowest valid upstream receiving water hardness values of 78 mg/l for Willow Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain. Effluent limitations must protect beneficial uses considering reasonable, worst-case conditions. We recognize that this approach does not necessarily agree with conclusions in other guidance stating that low flow conditions are the “worst-case” conditions. However, nothing in this Order is intended to suggest that low flows are inappropriate for determining the reasonable, worst-case conditions in other contexts.” (Emphasis added)

The Regional Board has cited the State Board's Water Quality Order (WQO)(No. 2008 0008) for the City of Davis as allowing complete discretion in utilizing the downstream hardness in deriving limits for toxic metals. WQO 2008 0008 in requiring the Regional Board to modify their permit states: “Revise the Fact Sheet to include a discussion of the appropriate hardness to use to protect from acute toxicity impacts (which can occur in short-term periods including storm events) in the receiving waters. The Fact Sheet should also state that the lowest valid upstream receiving water hardness values of 78 mg/l for Willow Slough Bypass and 85 mg/l for Conaway



Ranch Toe Drain should be used to determine reasonable potential for the effluent to exceed the hardness-dependent metal CTR criteria, unless additional evidence and analysis, consistent with this Order, demonstrates that different hardness values are appropriate to use and are fully protective of water quality.” The Regional Board did not use the lowest observed upstream hardness as required in WQO 2008 0008. The Regional Board has not provided additional evidence and analysis demonstrating that different hardness is fully protective of beneficial uses. To the contrary, the Regional Board does not address the March 24, 2000 the US Fish and Wildlife Service (Service) and the National Marine Fisheries Service (NMFS) CTR Biological Opinion cited above stating that the use of hardness alone is not protective of beneficial uses and recommending the sole use of the ambient upstream hardness in developing limits for toxic metals.

State Water Board Order WQO 2004 – 0013 for the City of Yuba City is also clear that the lowest observed hardness must be used in determining reasonable potential and developing Effluent Limitations for hardness dependant metals. The Yuba City Order states that: Conclusions No. 5; “In calculating the hardness value of the receiving water for purposes of determining the need for effluent limitations for metals, i.e., the reasonable potential, it is appropriate to use the “worst-case” historical data, but use of ICP data is more reliable than the titration method.”

The Regional Board’s arguments with regard to effluent and/or downstream receiving water hardness can only be made if in-stream mixing is considered. Mixing zones may be granted in accordance with extensive requirements contained in the SIP and the Basin Plan to establish Effluent Limitations. Mixing zones cannot be considered in conducting a reasonable potential analysis to determine whether a constituent will exceed a water quality standard or objective. The Regional Board’s approach in using the effluent or downstream hardness to conduct a reasonable potential analysis and consequently establish effluent limitations can only be utilized if mixing is considered; otherwise the ambient (upstream) hardness results in significantly more restrictive limitations. A mixing zone allowance has not been discussed with regard to this issue and therefore does not comply with the SIP. To the contrary, the Regional Board states that mixing zones are not being allowed for acute metals toxicity.

The issue is that the Regional Board fails to comply with the regulatory requirement to use the ambient instream hardness for limiting hardness dependant metals under the CTR. Failure to utilize the upstream ambient hardness for determining reasonable potential and developing limitations results in fewer and less restrictive Effluent Limitations.

**7. The Regional Board failed to use the most current criteria for copper resulting in the proposed Permit containing an inadequate effluent limitation in accordance with 40 CFR 122.44.**

In accordance with Federal Regulations, 40 CFR 122.44, the Regional Board is required to establish an effluent limitation if a pollutant is measured in the effluent which presents a reasonable potential to exceed a water quality standard or objective. In 2007 US EPA updated the Ambient Water Quality Criteria for Copper, (February 2007; EPA-822-F-07-001). Since



EPA published the hardness-based recommendation for copper criteria in 1984, new data have become available on copper toxicity and its effects on aquatic life.

The Biotic Ligand Model (BLM) – a metal bioavailability model that uses receiving water body characteristics to develop site-specific water quality criteria – utilizes the best available science and serves as the basis for the new national recommended criteria. The BLM requires ten input parameters to calculate a freshwater copper criterion (a saltwater BLM is not yet available): temperature, pH, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity. The BLM is used to derive the criteria rather than as a post-derivation adjustment as was the case with the hardness-based criteria. This allows the BLM-based criteria to be customized to the particular water under consideration.

BLM-based criteria can be more stringent than the current hardness-based copper criteria and in certain cases the current hardness-based copper criteria may be overly stringent for particular water bodies. We expect that application of this model will result in more appropriate criteria and eliminate the need for costly, time-consuming site-specific modifications using the water effect ratio. The Regional Board, in the proposed Permit, laments that the hardness based effluent limitation based solely on the ambient upstream hardness would be overly restrictive. Use of the new criteria resolves any issue about overly or under restrictive limitations and stands as a test of the Regional Board's sincerity to derive a limitation based on the latest available science. As is stated above, the BLM is based on ten input parameters and can be more or less restrictive than an effluent limitation based solely on hardness. Since the new criteria has the potential to be more restrictive than that which was developed on use of hardness alone, the Regional Board has not conducted an adequate reasonable potential analysis and has not used the latest criteria which may be more restrictive than that presented in the proposed Permit. The proposed Permit should be revised based on the use of the BLM and the latest EPA ambient criteria for copper.

**8. The proposed Permit fails to contain a protective Effluent Limitation for copper in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).**

The maximum observed effluent (MEC) concentration for copper was 6.34 ug/l Table F-20, which exceeds the most stringent California Toxics Rule (CTR) water quality standard of 3.0 ug/l. In accordance with Federal Regulations, 40 CFR 122.44, the Regional Board is required to establish an effluent limitation if a pollutant is measures in the effluent which presents a reasonable potential to exceed a water quality standard of objective. In accordance with the SIP, Section 1.3, since the maximum effluent concentration exceeded a water quality standard, an effluent limitation is required. California Water Code, section 13377, requires that: "Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."



The measured concentrations of copper at 6.34 ug/l clearly exceed the CTR water quality standard of 3.0 ug/l and in accordance with Federal and State Regulations and the SIP, effluent limitations are required.

The Regional Board however did not utilize the lowest observed ambient surface water hardness (26 mg/l) in developing an effluent limitation for copper. The proposed Permit includes an effluent limitation for copper based on the hardness of the effluent, which is 80 mg/l. Use of the effluent hardness in developing the effluent limitation for copper has resulted in an effluent limitation which does not comply with the regulatory requirement to use the instream ambient hardness and is not protective of the receiving stream aquatic life beneficial use. The Regional Board's use of the effluent hardness resulted in a chronic based effluent concentration allowance (ECA) of 7.7 ug/l rather than 3.0 ug/l (26 mg/l hardness) and an acute ECA of 11 ug/l rather than 3.9 ug/l (26 mg/l hardness). Use of the 19 mg/l total hardness value reported by the USGS would yield an even greater difference between the effluent hardness results utilized by the Regional Board.

Federal Regulation, 40 CFR 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not provide for compliance with the applicable requirements of the CWA, or regulations promulgated under the CWA, when imposition of conditions cannot ensure compliance with applicable water quality requirements and for any discharge inconsistent with a plan or plan amendment approved under Section 208(b) of the CWA. The copper effluent limitations in the proposed Permit are not protective of the aquatic life beneficial use of the receiving stream.

**9. The proposed Permit fails to contain an Effluent Limitation for lead in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).**

The maximum observed effluent (MEC) concentration for lead was 1.19 ug/l, Table F-2, which exceeds the most stringent California Toxics Rule (CTR) water quality standard of 0.55 ug/l. In accordance with Federal Regulations, 40 CFR 122.44, the Regional Board is required to establish an effluent limitation if a pollutant is measured in the effluent which presents a reasonable potential to exceed a water quality standard of objective. In accordance with the SIP, Section 1.3, since the maximum effluent concentration exceeded a water quality standard, an effluent limitation is required. California Water Code, section 13377, requires that: "Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."



The measured concentrations of lead at 1.19 ug/l clearly exceed the CTR water quality standard of 0.55 ug/l and in accordance with Federal and State Regulations and the SIP, effluent limitations are required.

The Regional Board did not utilize the lowest observed ambient surface water hardness (26 mg/l) in conducting the reasonable potential. The proposed Permit fails to include an effluent limitation for lead since the reasonable potential analysis was conducted based on the hardness of the effluent, which is 80 mg/l, rather than utilizing the lowest observed hardness of 26 mg/l. Use of the effluent hardness in developing the reasonable potential for lead has resulted a failure to include an effluent limitation in the proposed Permit. Use of the effluent hardness and failure to include an effluent limitation for lead does not comply with the regulatory requirement to use the instream ambient hardness and is not protective of the receiving stream aquatic life beneficial use. Use of the 19 mg/l total hardness value reported by the USGS would yield an even greater difference between the effluent hardness results utilized by the Regional Board.

The requirement to use the instream ambient hardness is discussed in greater detail above. State Water Board Order WQO 2004 – 0013 for the City of Yuba City is also clear that the lowest observed hardness must be used in determining reasonable potential and developing Effluent Limitations for hardness dependant metals. The Yuba City Order states that: Conclusions No. 5; “In calculating the hardness value of the receiving water for purposes of determining the need for effluent limitations for metals, i.e., the reasonable potential, it is appropriate to use the “worst-case” historical data, but use of ICP data is more reliable than the titration method.”

Federal Regulation, 40 CFR 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not provide for compliance with the applicable requirements of the CWA, or regulations promulgated under the CWA, when imposition of conditions cannot ensure compliance with applicable water quality requirements and for any discharge inconsistent with a plan or plan amendment approved under Section 208(b) of the CWA. The absence of an effluent limitation for lead in the proposed Permit is not protective of the aquatic life beneficial use of the receiving stream.

**10. The proposed Permit fails to contain an Effluent Limitation for zinc in violation of the California Toxics Rule, Federal Regulations (40 CFR 122.44), the California Water Code (CWC), Section 13377 and the State’s Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP).**

The maximum observed effluent (MEC) concentration for zinc was 33.5 ug/l, Table F-2, which exceeds the most stringent California Toxics Rule (CTR) water quality standard of 17.0 ug/l. In accordance with Federal Regulations, 40 CFR 122.44, the Regional Board is required to establish an effluent limitation if a pollutant is measures in the effluent which presents a reasonable potential to exceed a water quality standard of objective. In accordance with the SIP, Section 1.3, since the maximum effluent concentration exceeded a water quality standard, an effluent limitation is required. California Water Code, section 13377, requires that: “Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge and



dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.”

The measured concentrations of zinc at 33.5 ug/l clearly exceed the CTR water quality standard of 17.0 ug/l and in accordance with Federal and State Regulations and the SIP, effluent limitations are required.

The Regional Board did not utilize the lowest observed ambient surface water hardness (19 mg/l) in conducting the reasonable potential. The proposed Permit fails to include an effluent limitation for zinc since the reasonable potential analysis was conducted based on the hardness of the effluent, which is 80 mg/l, rather than utilizing the lowest observed hardness of 19 mg/l. Use of the effluent hardness in developing the reasonable potential for zinc has resulted in a failure to include an effluent limitation in the proposed Permit. Use of the effluent hardness and failure to include an effluent limitation for zinc does not comply with the regulatory requirement to use the instream ambient hardness and is not protective of the receiving stream aquatic life beneficial use. Use of the 19 mg/l total hardness value reported by the USGS would yield an even greater difference between the effluent hardness results utilized by the Regional Board.

The requirement to use the instream ambient hardness is discussed in greater detail above. State Water Board Order WQO 2004 – 0013 for the City of Yuba City is also clear that the lowest observed hardness must be used in determining reasonable potential and developing Effluent Limitations for hardness dependant metals. The Yuba City Order states that: Conclusions No. 5; “In calculating the hardness value of the receiving water for purposes of determining the need for effluent limitations for metals, i.e., the reasonable potential, it is appropriate to use the “worst-case” historical data, but use of ICP data is more reliable than the titration method.”

Federal Regulation, 40 CFR 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not provide for compliance with the applicable requirements of the CWA, or regulations promulgated under the CWA, when imposition of conditions cannot ensure compliance with applicable water quality requirements and for any discharge inconsistent with a plan or plan amendment approved under Section 208(b) of the CWA. The absence of an effluent limitation for zinc in the proposed Permit is not protective of the aquatic life beneficial use of the receiving stream.

**11. The proposed Permit fails to implement the requirements of the Basin Plan, Implementation, Policy for Application of Water Quality Objectives with regard to additive toxicity.**

The Proposed Permit shows based on the instream ambient hardness, that copper, lead and zinc are present in the discharge at elevated concentrations. The combination of copper, lead and zinc has a potential for exhibiting additive toxic effects. The Basin Plan, *Implementation, Policy for Application of Water Quality Objectives* requires that: “Where multiple toxic pollutants exist together in water, the potential for toxicologic interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and effluent data to determine



*whether there is a reasonable potential for interactive toxicity. Pollutants which are carcinogens or which manifest their toxic effects on the same organ systems or through similar mechanisms will generally be considered to have potentially additive toxicity.”*

The Basin Plan is a policy of the Regional Board. California Water Code § 13146. State Agency Compliance requires that state offices, departments and boards, in carrying out activities which affect water quality, shall comply with state policy for water quality control unless otherwise directed or authorized by statute, in which case they shall indicate to the state board in writing their authority for not complying with such policy.

The Regional Board has failed to follow policy by not assessing the additive toxic effects of copper, lead and zinc ignoring the requirements of CWC Section 13146.

**12. The proposed permit contains an inadequate reasonable potential by using incorrect statistical multipliers as required by Federal regulations, 40 CFR § 122.44(d)(1)(ii).**

Federal regulations, 40 CFR § 122.44(d)(1)(ii), state “when determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, **the variability of the pollutant or pollutant parameter in the effluent**, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.” Emphasis added. The reasonable potential analysis fails to consider the statistical variability of data and laboratory analyses as explicitly required by the federal regulations. The procedures for computing variability are detailed in Chapter 3, pages 52-55, of USEPA’s *Technical Support Document For Water Quality-based Toxics Control*. The Regional Water Board conducted the RPA in accordance with Section 1.3 of the SIP. The proposed Permit fails to discuss compliance with 40 CFR § 122.44(d)(1)(ii).

The State and Regional Boards do not have the authority to override and ignore federal regulation. A statistical analysis results in a projected maximum effluent concentration (MEC) based on laboratory variability and the resulting MEC is greater than was obtained from the actual sampling data. The result of using statistical variability is that a greater number of constituents will have a reasonable potential to exceed water quality standards and therefore a permit will have a greater number of effluent limitations. The intentional act of ignoring the Federal regulation has a clear intent of limiting the number of regulated constituents in an NPDES permit. The fact that the SIP illegally ignores this fundamental requirement does not exempt the Regional Board from its obligation to consider statistical variability in compliance with federal regulations. The failure to utilize statistical variability results in significantly fewer Effluent Limitations that are necessary to protect the beneficial uses of receiving waters. The reasonable potential analyses are flawed and must be recalculated.

**13. The proposed Permit contains a compliance time schedule “effective immediately and ending on 30 November 2020” to meet the discharge limitations for BOD, TSS, ammonia, coliform organisms, chlorine and chlorpyrifos that exceeds the requirements of the Basin Plan.**



The proposed Permit allows 10 years for the Discharger to comply with discharge limitations for BOD, TSS, ammonia, coliform organisms, chlorine and chlorpyrifos. The Basin Plan, Implementation, requires that where it is infeasible immediately achieve compliance a schedule of compliance may be granted based on the shortest practicable time but no longer than ten years.

The proposed Permit contains numerous limitations based on the California Toxic Rule which was adopted in 2000 with a final date for compliance with water quality standards by 18 May 2010. That date has passed.

The existing NPDES permit for this facility was adopted in 2000. NPDES permits have a five year lifespan. Based on our routine review of NPDES permits from the Central Valley Region it is typical that a 5-year compliance schedule is granted for planning, design and construction of tertiary wastewater treatment systems. It is also typical that Dischargers generally comply with these time schedules.

40 C.F.R. section 131.38(e)(3) formerly authorized compliance schedules delaying the effective date of WQBELs being set based on the NTR and CTR. Pursuant to 40 C.F.R. section 131.38(e)(8), however, this compliance schedule authorization *expressly expired* on May 18, 2005, depriving the State and Regional Boards with any authority to issue compliance schedules delaying the effective date of such WQBELs. Indeed, the EPA Federal Register Preamble accompanying the CTR stated as much, noting, “EPA has chosen to promulgate the rule with a sunset provision which states that the authorizing compliance schedule provision will cease or sunset on May 18, 2005.”

The Regional Board may contend that the EPA Federal Register Preamble has effectively extended this compliance schedule authority when the Preamble observed, “[I]f the State Board adopts, and EPA approves, a statewide authorizing compliance schedule provision significantly prior to May 18, 2005, EPA will act to stay the authorizing compliance schedule provision in today’s rule.” It is true that the State Board subsequently adopted its Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, enacted by State Board Resolution No. 2000-015 (March 2, 2000) (“State Implementation Plan” or “SIP”) and that the SIP provides for compliance schedules without imposing a May 18, 2005 cutoff. EPA, however, *has not* acted to stay 40 C.F.R. section 131.38(e)(8) by the only means it can lawfully do so: notice and comment rulemaking that amends 40 C.F.R. section 131.38(e)(8). Without such a rulemaking, 40 C.F.R. section 131.38(e)(8) remains the law and it unequivocally ends authorization to issue compliance schedules after May 18, 2000. *See Friends of the Earth, Inc. v. Environmental Protection Agency*, 446 F.3d 140 (D.C. Cir. 2006).

Even if 40 C.F.R. section 131.38(e)(8) did not preclude issuing compliance schedules which delay the effective date of WQBELs set under the NTR and CTR, the CWA itself precludes such compliance schedules—and any compliance schedule which delays the effective date of WQBELs past 1977.



Numerous courts have held that neither the EPA nor the States have the authority to extend the deadlines for compliance established by Congress in CWA section 301(b)(1). 33 U.S.C. §1311(b)(1); *See State Water Control Board v. Train*, 559 F.2d 921, 924-25 (4th Cir. 1977) (“Section 301(b)(1)’s effluent limitations are, on their face, unconditional”); *Bethlehem Steel Corp. v. Train*, 544 F.2d 657, 661 (3d Cir. 1976), *cert. denied sub nom. Bethlehem Steel Corp. v. Quarles*, 430 U.S. 975 (1977) (“Although we are sympathetic to the plight of Bethlehem and similarly situated dischargers, examination of the terms of the statute, the legislative history of [the Clean Water Act] and the case law has convinced us that July 1, 1977 was intended by Congress to be a rigid guidepost”).

This deadline applies equally to technology-based effluent limitations and WQBELs. *See Dioxin/Organochlorine Ctr. v. Rasmussen*, 1993 WL 484888 at \*3 (W.D. Wash. 1993), *aff’d sub nom. Dioxin/Organochlorine Ctr. v. Clarke*, 57 F.3d 1517 (9th Cir. 1995) (“The Act required the adoption by the EPA of ‘any more stringent limitation, including those necessary to meet water quality standards,’ by July 1, 1977”) (citation omitted); *Longview Fibre Co. v. Rasmussen*, 980 F.2d 1307, 1312 (9th Cir. 1992) (“[Section 1311(b)(1)(C)] requires achievement of the described limitations ‘not later than July 1, 1977.’ ”) (citation omitted). Any discharger not in compliance with a WQBEL after July 1, 1977, violates this clear congressional mandate. *See Save Our Bays and Beaches v. City & County of Honolulu*, 904 F. Supp. 1098, 1122-23 (D. Haw. 1994).

Congress provided no blanket authority in the Clean Water Act for extensions of the July 1, 1977, deadline, but it did provide authority for the States to foreshorten the deadline. CWA section 303(f) (33 U.S.C. § 1313(f)) provides that: “[n]othing in this section [1313] shall be construed to affect any effluent limitations or schedule of compliance required by any State to be implemented prior to the dates set forth in section 1311(b)(1) and 1311(b)(2) of this title nor to preclude any State from requiring compliance with any effluent limitation or schedule of compliance at dates earlier than such dates.”

Because the statute contains explicit authority to expedite the compliance deadline but not to extend it, the Regional Board may not authorize extensions beyond this deadline in discharge permits.

The July 1, 1977, deadline for achieving WQBELs applies equally even if the applicable WQS are established after the compliance deadline. 33 U.S.C. section 1311(b)(1)(C) requires the achievement of “more stringent limitations necessary to meet water quality standards . . . established pursuant to any State law . . . or required to implement any applicable water quality standard established pursuant to this chapter.” Congress understood that new WQS would be established after the July 1, 1977, statutory deadline; indeed, Congress mandated this by requiring states to review and revise their WQS every three years. *See* 33 U.S.C. § 1313(c). Yet, Congress did not draw a distinction between achievement of WQS established before the deadline and those established after the deadline.

Prior to July 1, 1977, therefore, a discharger could be allowed some time to comply with an otherwise applicable water quality-based effluent limitation. Beginning on July 1, 1977, however, dischargers were required to comply as of the date of permit issuance with WQBELs, including those necessary to meet standards established subsequent to the compliance deadline.



In the Clean Water Act Amendments of 1977, Congress provided limited extensions of the July 1, 1977, deadline for achieving WQBELs. In CWA section 301(i), Congress provided that “publicly-owned treatment works” (“POTWs”) that must undertake new construction in order to achieve the effluent limitations, and need Federal funding to complete the construction, may be eligible for a compliance schedule that may be “in no event later than July 1, 1988.” 33 U.S.C. § 1311(i)(1) (emphasis added). Congress provided for the same limited extension for industrial dischargers that discharge into a POTW that received an extension under section 1311(i)(1). *See* 33 U.S.C. § 1311(i)(2). In addition, dischargers that are not eligible for the time extensions provided by section 1311(i) but that do discharge into a POTW, may be eligible for a compliance schedule of no later than July 1, 1983. *See* 33 U.S.C. § 1319(a)(6).

The fact that Congress explicitly authorized certain extensions indicates that it did not intend to allow others, which it did not explicitly authorize. In *Homestake Mining*, the Eighth Circuit held that an enforcement extension authorized by section 1319(a)(2)(B) for technology-based effluent limitations did not also extend the deadline for achievement of WQBELs. 595 F.2d at 427-28. The court pointed to Congress' decision to extend only specified deadlines: “[h]aving specifically referred to water quality-based limitations in the contemporaneously enacted and similar subsection [1319](a)(6), the inference is inescapable that Congress intended to exclude extensions for water quality-based permits under subsection [1319](a)(5) by referring therein only to Section [1311](b)(1)(A). *Id.* at 428 (citation omitted). By the same reasoning, where Congress extended the deadline for achieving effluent limitations for specific categories of discharges and otherwise left the July 1, 1977, deadline intact, there is no statutory basis for otherwise extending the deadline.

The Clean Water Act defines the term effluent limitation as: “any restriction established . . . on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.” 33 U.S.C. § 1362(11).

The term schedule of compliance is defined, in turn, as “a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.” 33 U.S.C. § 1362(17). The purpose of a compliance schedule is to facilitate compliance with an effluent limitation by the applicable deadline by inserting interim goals along the way: “[a] definition of effluent limitations has been included so that control requirements are not met by narrative statements of obligation, but rather are specific requirements of specificity as to the quantities, rates, and concentration of physical, chemical, biological and other constituents discharged from point sources. It is also made clear that the term effluent limitation includes schedules and time tables of compliance. The Committee has added a definition of schedules and time-tables of compliance so that it is clear that enforcement of effluent limitations is not withheld until the final date required for achievement.” S. Rep. No. 92-414, at 77, *reprinted in* 1972 U.S.C.C.A.N. 3668 (Oct. 28, 1971) (emphasis added). Thus, Congress authorized compliance schedules, not to extend its deadlines for achievement of effluent limitations, but to facilitate achievement by the prescribed deadlines.



In *United States Steel Corp.*, the industry plaintiff argued that 33 U.S.C. § 1311(b)(1)(C) allows the July 1, 1977, deadline to be met simply by beginning action on a schedule of compliance that eventually would result in achieving the technology- and water quality-based limitations. 556 F.2d at 855. The Court of Appeals disagreed: “[w]e reject this contorted reading of the statute. We recognize that the definition of ‘effluent limitation’ includes ‘schedules of compliance,’ section [1362(11)], which are themselves defined as ‘schedules . . . of actions or operations leading to compliance’ with limitations imposed under the Act. Section [1362(17)]. It is clear to us, however, that section [1311(b)(1)] requires point sources to achieve the effluent limitations based on BPT or state law, not merely to be in the process of achieving them, by July 1, 1977.” *Id.* Thus, compliance schedule may not be used as a means of evading, rather than meeting, the deadline for achieving WQBELs.

Finally, a compliance schedule that extends beyond the statutory deadline would amount to a less stringent effluent limit than required by the CWA. States are explicitly prohibited from establishing or enforcing effluent limitations less stringent than are required by the CWA. *See* 33 U.S.C. § 1370; Water Code §§ 13372, 13377. The clear language of the statute, bolstered by the legislative history and case law, establishes unambiguously that compliance schedules extending beyond the July 1, 1977, deadline may not be issued in discharge permits. The Permit, however, purports to do just that. By authorizing the issuance of permits that delay achievement of effluent limitations for over thirty years beyond Congress’ deadline, the Permit makes a mockery of the CWA section 301(b)(1)(C) deadline and exceeds the scope of the Regional Board’s authority under the Clean Water Act and the Porter-Cologne Act. 33 U.S.C. § 1311(b)(1)(C).

The proposed Permit allows twice the time that is typically allowed for Dischargers to comply with similar limitations to those contained in the proposed Permit. This is also 5 years beyond the life of the permit and 10 years after full compliance with the CTR was to have been achieved. The proposed Permit details that the beneficial uses and water quality suffers significantly from existing quality of the discharge. Another ten years of degraded recreational, aquatic life and drinking water beneficial uses is unacceptable. The aquatic life within the Delta has suffered dramatic decline which most agree is at least in part to degraded water quality. The Regional Board has not presented any reasonable defense that the allotted compliance schedule is “based on the shortest practicable time”.

**14. The proposed Permit fails to contain an adequate effluent limitation for electrical conductivity (EC) in violation of federal regulation 40 CFR 122.44.**

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; “Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.” The Water Quality Control Plan (Basin Plan) for the Central Valley Region, Water Quality Objectives, page III-3.00, contains a Chemical Constituents Objective that includes Title 22 Drinking Water Maximum Contaminant Levels (MCLs) by reference. The Title 22 MCLs for EC are 900 µmhos/cm (recommended level), 1,600 µmhos/cm (upper level) and 2,200 µmhos/cm (short term maximum).



The Basin Plan states, on Page III-3.00 Chemical Constituents, that “Waters shall not contain constituents in concentrations that adversely affect beneficial uses.” The Basin Plan’s “Policy for Application of Water Quality Objectives” provides that in implementing narrative water quality objectives, the Regional Board will consider numerical criteria and guidelines developed by other agencies and organizations. This application of the Basin Plan is consistent with Federal Regulations, 40CFR 122.44(d).

For EC, *Ayers R.S. and D.W. Westcott, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985)*, levels above 700  $\mu\text{mhos/cm}$  will reduce crop yield for sensitive plants. The University of California, Davis Campus, Agricultural Extension Service, published a paper, dated 7 January 1974, stating that there will not be problems to crops associated with salt if the EC remains below 750  $\mu\text{mhos/cm}$ .

The discharge of EC or TDS may exceed water quality objectives for each designated beneficial use:

- MUN: The Drinking Water maximum contaminant levels (MCLs) are water quality objectives incorporated into the Basin Plan Chemical Constituents by reference. The MCL for TDS is 500 mg/l as the recommended level, 1,000 mg/l as an upper level and 1,500 mg/l as a short term maximum. *McKee and Wolf* (1971 Water Quality Criteria) cites that waters above 4,000 mg/l TDS are generally unfit for human use.
- AGR: The Basin Plan states, on Page III-3.00 Chemical Constituents, that “Waters shall not contain constituents in concentrations that adversely affect beneficial uses.” The Basin Plan’s “Policy for Application of Water Quality Objectives” provides that in implementing narrative water quality objectives, the Regional Board will consider numerical criteria and guidelines developed by other agencies and organizations. This application of the Basin Plan is consistent with Federal Regulations, 40CFR 122.44(d). For EC, *Ayers R.S. and D.W. Westcott, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985)*, levels above 700  $\mu\text{mhos/cm}$  will reduce crop yield for sensitive plants. The State Water Resources Control Board’s *Irrigation with Reclaimed Municipal Waste (July 1984)* and *McKee and Wolf* (1971 Water Quality Criteria), state that waters with TDS above 2,100 mg/l are unsuitable for any irrigation under most conditions.
- IND: *McKee and Wolf* (1971 Water Quality Criteria) lists the limiting TDS concentrations for numerous industrial uses in mg/l; boiler feed water 50-3000, brewing 500-1000, canning 850, general food processing 850 and paper manufacturing 80-500.



COLD/MIGR/SPWN: In a *Biological Significance* document sent to the Regional Board regarding the Musco Olive facility, dated November 1<sup>st</sup> 2006, James M. Harrington, Staff Water Quality Biologist with the California Department of Fish and Game, citing McKee and Wolf (1971 Water Quality Criteria) wrote that: "Surveys of inland fresh waters indicates that good mixes of fish fauna are found where conductivity values range between 150 and 500 umhos/cm. Even in the most alkaline waters, the upper tolerance limit for aquatic life is approximately 2000 umhos/cm."

The beneficial uses of receiving streams may be degraded by salt concentrations in wastewater discharges and Federal Regulation, 40 CFR 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not provide for compliance with the applicable requirements of the CWA, or regulations promulgated under the CWA, when imposition of conditions cannot ensure compliance with applicable water quality requirements and for any discharge inconsistent with a plan or plan amendment approved under Section 208(b) of the CWA. California Water Code, section 13377, requires that: "Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." The Region 5 Permit does not protect the beneficial uses of the receiving stream, the Sacramento River, and therefore does not comply with the requirements of Federal Regulations and the California Water Code.

The wastewater discharge average EC level is 764 µmhos/cm and the maximum observed EC was 960 µmhos/cm. Clearly the discharge exceeds the MCLs for EC presenting a reasonable potential to exceed the water quality objective. The proposed permit contains a performance based annual average effluent limitation for EC of 840 µmhos/cm. The proposed EC limitation clearly exceeds the agricultural water quality goal and the MCL for EC. The proposed Order fails to establish an effluent limitation for EC that are protective of the Chemical Constituents water quality objective.

The proposed Permit, page F-48, states that: "*Due to the site-specific conditions of the discharge, the Central Valley Water Board has used best professional judgment in determining the appropriate method for conducting the RPA for these non-priority pollutant salinity constituents. For conducting the RPA, the USEPA recommends using a mass-balance approach to determine the expected critical downstream receiving water concentration using a steady-state approach. This downstream receiving water concentration is then compared to the applicable water quality objectives to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion. This approach allows assimilative capacity and dilution to be factored into the RPA.*"



The Regional Board's unique approach for determining reasonable potential can only be undertaken if a mixing zone is considered. The Regional Board cites "site-specific conditions" that would warrant such an approach but fails to define any unique conditions here. Basically this is a wastewater discharge into a river – nothing exotic except for the politics. The Regional Board's cited approach for determining reasonable potential is contrary to the regulations. Mixing can only be considered after the reasonable potential has been conducted and an effluent limitation established.

A mixing zone, by definition, is an area where water quality standards are allowed to be exceeded. If water quality standards are known to be exceeded – there is obviously beyond a reasonable potential for the discharge to exceed the water quality standard. If the water quality standard is exceeded there is reasonable potential under 40 CFR 122.44 (d)(i). 40 CFR 122.44 (d)(i) requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Clearly at the point of discharge the discharge of 960 umhos/cm exceeds the agricultural goal of 700 umhos/cm, the drinking water MCL of 900 umhos/cm and the salinity standards for the Delta contained in the Basin Plan. There is beyond a reasonable potential for the discharge to exceed water quality standards for EC, they are exceeded by the discharge. An EC effluent limitation is mandated by federal regulation and the proposed Permit must be amended accordingly.

The proposed permit, Page F-73, states that: "...in addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge." The mixing zone has not been defined for salinity. The size of the mixing zone has not been defined. It is reasonable to assume that since there are numerous irrigation intakes within 1 to 2 miles of the discharge that the intakes would be impacted by inadequately diluted wastewater containing EC above the agricultural goal. The proposed mixing zone for salinity has not met any of the requirements in the SIP or the Basin Plan.

**15. The proposed Permit fails to contain an effluent limitation for total dissolved solids (TDS) in violation of federal regulation 40 CFR 122.44.**

Federal Regulations, 40 CFR 122.44 (d)(i), requires that; "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." The Water Quality Control Plan (Basin Plan) for the Central Valley Region, Water Quality Objectives, page III-3.00, contains a Chemical Constituents Objective that includes Title 22 Drinking Water Maximum Contaminant Levels (MCLs) by reference. The Title 22 MCLs for TDS are 500 mg/l (recommended level), 1,000 mg/l (upper level) and 1,500 mg/l (short term maximum).

The proposed Permit, Table F-14, shows the maximum effluent concentration of TDS was 540 mg/l. There is a reasonable potential for the discharge of TDS at 540 mg/l to exceed the drinking



water MCL of 500 mg/l. EC and TDS are related and in most discharges one can generally be translated to the other by a simple multiplier; this discharge has industrial dischargers that would impact the EC to TDS relationship and the relationship has not been defined. There is no evidence in the proposed Permit regarding the consistency of an EC to TDS relationship; therefore regulating EC may not adequately control TDS.

*The proposed Permit, page F-48, states that: “Due to the site-specific conditions of the discharge, the Central Valley Water Board has used best professional judgment in determining the appropriate method for conducting the RPA for these non-priority pollutant salinity constituents. For conducting the RPA, the USEPA recommends using a mass-balance approach to determine the expected critical downstream receiving water concentration using a steady-state approach. This downstream receiving water concentration is then compared to the applicable water quality objectives to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion. This approach allows assimilative capacity and dilution to be factored into the RPA.”*

The Regional Board’s unique approach for determining reasonable potential can only be undertaken if a mixing zone is considered. The Regional Board cites “site-specific conditions” that would warrant such an approach but fails to define any unique conditions. Basically this is a wastewater discharge into a river – nothing exotic except for the politics. The Regional Board’s cited approach for determining reasonable potential is contrary to the regulations. Mixing can only be considered after the reasonable potential has been conducted and an effluent limitation established. A mixing zone, by definition, is an area where water quality standards are allowed to be exceeded. If water quality standards are known to be exceeded – there is obviously beyond a reasonable potential for the discharge to exceed the water quality standard. If the water quality standard is exceeded there is reasonable potential under 40 CFR 122.44 (d)(i). 40 CFR 122.44 (d)(i) requires that; “Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.” Clearly at the point of discharge the discharge of 540 mg/l exceeds the drinking water MCL of 500 mg/l. There is beyond a reasonable potential for the discharge to exceed water quality standards for TDS, they are exceeded by the discharge. A TDS effluent limitation is mandated by federal regulation and the proposed Permit must be amended accordingly.

**16. The proposed Permit fails to meet the preconditions necessary to exempt waste storage, treatment and disposal ponds from California Code of Regulations Title 27 and fails to implement the requirements of CCR Title 27.**

CCR Title 27 §20090. SWRCB - Exemptions. (C15: §2511):

“The following activities shall be exempt from the SWRCB-promulgated provisions of this subdivision, so long as the activity meets, and continues to meet, all preconditions listed: (a) **Sewage**—Discharges of domestic sewage or treated effluent which are regulated by WDRs issued pursuant to Chapter 9, Division 3, Title 23 of this code, or for which WDRs have been waived, and which are consistent with applicable water quality



objectives, and treatment or storage facilities associated with municipal wastewater treatment plants, provided that residual sludges or solid waste from wastewater treatment facilities shall be discharged only in accordance with the applicable SWRCB-promulgated provisions of this division. (b) **Wastewater**—Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields if the following conditions are met: (1) the applicable RWQCB has issued WDRs, reclamation requirements, or waived such issuance; (2) the discharge is in compliance with the applicable water quality control plan; and (3) the wastewater does not need to be managed according to Chapter 11, Division 4.5, Title 22 of this code as a hazardous waste.” (Emphasis added)

#### Region 5’s Basin Plan, Water Quality Objectives for Ground Waters:

The following objectives apply to all ground waters of the Sacramento and San Joaquin River Basins, as the objectives are relevant to the protection of designated beneficial uses. These objectives do not require improvement over naturally occurring background concentrations. The ground water objectives contained in this plan are not required by the federal Clean Water Act.

##### **Bacteria**

In ground waters used for domestic or municipal supply (MUN) the most probable number of coliform organisms over any seven-day period shall be less than 2.2/100 ml.

##### **Chemical Constituents**

Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels- Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. To protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

##### **Tastes and Odors**

Ground waters shall not contain taste- or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

##### **Toxicity**

Ground waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated



with designated beneficial use(s). This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.

The proposed Permit, pages F-13 and 14, states the following:

4. Emergency Storage Basins (ESBs). The Facility includes five Emergency Storage Basins (ESBs), ESB-A through E with a total capacity of 302 million gallons (MG). ESB-A is lined with concrete and has 15.5 MG of capacity. The purpose of ESB-A is to store diverted influent flows above the SRWTP hydraulic capacity (peak wet weather flows) and store diverted effluent flows to meet various conditions to comply with the NPDES permit. Reasons to divert final effluent to ESB-A and not discharge to the Sacramento River include maintaining the minimum 14:1 river to effluent ratio, maintaining effluent temperature requirements, and maintaining chlorine limits. Flow stored in ESB-A is returned to the SRWTP headworks for treatment.

Overflow from ESB-A discharges to unlined ESB-B that can if necessary overflow to unlined ESBC. The combined capacity of ESB-B and C is 206 MG. Since construction of ESBD, ESB-A is typically only used to store excess influent flows. ESB-A, B and C are exempt from Title 27, § 20090(a) since these basins are integral to protecting the SRWTP treatment processes from washing out due to peak wet weather flows or for storage of diverted flow to comply NPDES permit conditions.

ESB-D is lined with 60-mil reinforced polypropylene liner and has a capacity of 60-75 MG. The primary use of ESB-D is to stored diverted chlorinated effluent to comply with flow dilution, potential chlorine excursions and thermal requirements. Chlorinated effluent from ESB-D is returned to the SRWTP for dechlorination prior to discharge to the Sacramento River. Since ESB-D is lined there is minimal threat to groundwater and is consistent with water quality objectives and therefore is exempt from Title 27 § 20090(a).

ESB-E is part of the surge relief mechanism and designed to relief waterhammer effects in the influent conduit. ESB-E stores raw influent in an unlined earthen 20 MG basin and is exempt from Title 27 § 20090(a).

The preconditions to grant an exemption for municipal WWTPs from regulation under CCR Title 27 are that; the discharge is regulated by WDRs; the discharge is consistent with applicable water quality objectives; the treatment and storage facilities are associated with a municipal WWTP, and sludge is properly regulated in accordance with CCR Title 27. The discharge is regulated by WDRs. The treatment and storage facilities are associated with a municipal WWTP. Sludge is regulated in accordance with CCR Title 27. An exemption from CCR Title cannot be granted as the precondition that the discharge complies with applicable water quality objectives has not been established. Specifically:

- ESB-B and ESB-C are unlined, groundwater in the area is shallow, the groundwater has been degraded by similar wastewater discharges and there is no monitoring showing the pond has not caused the exceedance of the Basin Plan water quality objectives for groundwater. The preconditions for an exemption from CCR Title 27 have not been



established.

- ESB-E stores raw sewage influent in an unlined earthen 20 MG basin, groundwater in the area is shallow, the groundwater has been degraded by similar wastewater discharges and there is no monitoring showing the pond has not caused the exceedance of the Basin Plan water quality objectives for groundwater. The preconditions for an exemption from CCR Title 27 have not been established.

Contrary to the proposed Permit findings, the preconditions for exemption from CCR Title 27 have not been established and the proposed Permit must be revised to properly regulate the ponds under CCR Title 27.

**17. The proposed Permit contains an allowance for a mixing zone that does not comply with the requirements of Federal Regulation 40 CFR Section 131.12 (a)(1) and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) or the Basin Plan.**

“A mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient waterbody. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented” according to EPA’s *Technical Support Document for Water Quality-based Toxics Control* (TSD) (USEPA, 1991), (Water quality criteria must be met at the edge of a mixing zone.). Mixing zones are regions within public waters adjacent to point source discharges where pollutants are diluted and dispersed at concentrations that routinely exceed human health and aquatic life water quality standards (the maximum levels of pollutants that can be tolerated without endangering people, aquatic life, and wildlife.) Mixing zone policies allow a discharger’s point of compliance with state and federal water quality standards to be moved from the “end of the pipe” to the outer boundaries of a dilution zone.

The CWA was adopted to minimize and eventually eliminate the release of pollutants into public waters because fish were dying and people were getting sick. The CWA requires water quality standards (WQS) be met in all waters to prohibit concentrations of pollutants at levels assumed to cause harm. Since WQS criteria are routinely exceeded in mixing zones it is likely that in some locations harm is occurring. The general public is rarely aware that local waters are being degraded within these mixing zones, the location of mixing zones within a waterbody, the nature and quantities of pollutants being diluted, the effects the pollutants might be having on human health or aquatic life, or the uses that may be harmed or eliminated by the discharge. Standing waist deep at a favorite fishing hole, a fisherman has no idea that he is in the middle of a mixing zone for a sewage discharger that has not been required to adequately treat their waste.

In 1972, backed by overwhelming public support, Congress overrode President Nixon’s veto and passed the Clean Water Act. Under the CWA, states are required to classify surface waters by *uses* – the beneficial purposes provided by the waterbody. For example, a waterbody may be designated as a drinking water source, or for supporting the growth and propagation of aquatic life, or for allowing contact recreation, or as a water source for industrial activities, or all of the above. States must then adopt *criteria* – numeric and narrative limits on pollution, sufficient to



protect the uses assigned to the waterbody. *Uses + Criteria = Water Quality Standards (WQS)*. WQS are regulations adopted by each state to protect the waters under their jurisdiction. If a waterbody is classified for more than one use, the applicable WQS are the criteria that would protect the most sensitive use.

All wastewater dischargers to surface waters must apply for and receive a permit to discharge pollutants under the National Pollutant Discharge Elimination System (NPDES.) Every NPDES permit is required to list every pollutant the discharger anticipates will be released, and establish effluent limits for these pollutants to ensure the discharger will achieve WQS. NPDES permits also delineate relevant control measures, waste management procedures, and monitoring and reporting schedules.

It is during the process of assigning effluent limits in NPDES permits that variances such as mixing zones alter the permit limits for pollutants by multiplying the scientifically derived water quality criteria by dilution factors. The question of whether mixing zones are legal has never been argued in federal court.

Mixing zones are never mentioned or sanctioned in the CWA. To the contrary, the CWA appears to speak against such a notion:

“whenever...the discharges of pollutants from a point source...would interfere with the attainment or maintenance of that water quality...which shall assure protection of public health, public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations...shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality.”

A plain reading of the above paragraph calls for the application of effluent limitations whenever necessary to assure that *WQS will be met in all waters*. Despite the language of the Clean Water Act; US EPA adopted 40 CFR 131.13, General policies, that allows States to, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. According to EPA; (EPA, Policy and Guidance on Mixing Zones, 63 Fed Reg. 36,788 (July 7, 1998)) as long as mixing zones do not eliminate beneficial uses in the whole waterbody, they do not violate federal regulation or law. California has mixing zone policies included in individual Water Quality Control Plans (Basin Plans) and the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (2005) permitting pollutants to be diluted before being measured for compliance with the state's WQS.

Federal Antidegradation regulations at 40 CFR 131.12 require that states protect waters at their present level of quality and that all beneficial uses remain protected. The corresponding State Antidegradation Policy, Resolution 68-16, requires that any degradation of water quality not unreasonably affect present and anticipated beneficial uses. Resolution 68-16 further requires that: “Any activity which produces or may produce or increase volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to



meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained.”

- Pollution is defined in the California Water Code as an alteration of water quality to a degree which unreasonably affects beneficial uses. In California, Water Quality Control Plans (Basin Plans) contain water quality standards and objectives which are necessary to protect beneficial uses. The Basin Plan for California’s Central Valley Regional Water Board states that: “According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives. State law also requires that Basin Plans conform to the policies set forth in the Water Code beginning with Section 13000 and any state policy for water quality control. Since beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the state and federal requirements for water quality control (40 CFR 131.20).”
- Nuisance is defined in the California Water Code as anything which is injurious to health, indecent, offensive or an obstruction of the free use of property which affects an entire community and occurs as a result of the treatment or disposal of waste.

The Antidegradation Policy (Resolution 68-16) allows water quality to be lowered as long as beneficial uses are protected (pollution or nuisance will not occur), best practicable treatment and control (BPTC) of the discharge is provided, and the degradation is in the best interest of the people of California. Water quality objectives were developed as the maximum concentration of a pollutant necessary to protect beneficial uses and levels above this concentration would be considered pollution. The Antidegradation Policy does not allow water quality standards and objectives to be exceeded. Mixing zone are regions within public waters adjacent to point source discharges where pollutants are diluted and dispersed at concentrations that routinely exceed water quality standards.

The Antidegradation Policy (Resolution 68-16) requires that best practicable treatment or control (BPTC) of the discharge be provided. Mixing zones have been allowed in lieu of treatment to meet water quality standards at the end-of-the-pipe prior to discharge. To comply with the Antidegradation Policy, the tradeoff of receiving water beneficial uses for lower utility rates must be in the best interest of the people of the state and must also pass the test that the Discharger is providing BPTC. By routinely permitting excessive levels of pollutants to be legally discharged, mixing zones act as an economic disincentive to Dischargers who might otherwise have to design and implement better treatment mechanisms. Although the use of mixing zones may lead to individual, short-term cost savings for the discharger, significant long-term health and economic costs may be placed on the rest of society. An assessment of BPTC, and therefore compliance with the Antidegradation Policy, must assess whether treatment of the wastestream can be accomplished, is feasible, and not simply the additional costs of compliance with water quality standards. A BPTC case can be made for the benefits of prohibiting mixing



zones and requiring technologies that provide superior waste treatment and reuse of the wastestream.

EPA's Water Quality Standards Handbook states that: "It is not always necessary to meet all water quality criteria within the discharge pipe to protect the integrity of the waterbody as a whole." The primary mixing area is commonly referred to as the zone of initial dilution, or ZID. Within the ZID acute aquatic life criteria are exceeded. To satisfy the CWA prohibition against the discharge of toxic pollutants in toxic amounts, regulators assume that if the ZID is small, significant numbers of aquatic organisms will not be present in the ZID long enough to encounter acutely toxic conditions. EPA recommends that a ZID not be located in an area populated by non-motile or sessile organisms, which presumably would be unable to leave the primary mixing area in time to avoid serious contamination.

Determining the impacts and risks to an ecosystem from mixing pollutants with receiving waters at levels that exceed WQS is extremely complex. The range of effects pollutants have on different organisms and the influence those organisms have on each other further compromises the ability of regulators to assess or ensure "acceptable" short and long-term impacts from the use of mixing zones. Few if any mixing zones are examined prior to the onset of discharging for the potential effects on impacted biota (as opposed to the physical and chemical fate of pollutants in the water column). Biological modeling is especially challenging – while severely toxic discharges may produce immediately observable effects, long-term impacts to the ecosystem can be far more difficult to ascertain. The effects of a mixing zone can be insidious; impacts to species diversity and abundance may be impossible to detect until it is too late for reversal or mitigation.

The *CALIFORNIA CONSTITUTION, ARTICLE 10, WATER, SEC. 2* states that: "It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which the owner's land is riparian under reasonable methods of diversion and use, or as depriving any appropriator of water to which the appropriator is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained." The granting of a mixing zone is an unreasonable use of water when proper treatment of the wastestream can be accomplished to meet end-of-pipe limitations. Also contrary to the California Constitution, a mixing zone does not *serve the beneficial use*; to the contrary, beneficial uses are degraded within the mixing zone.



The Central Valley Regional Water Quality Control Board's Basin Plan, page IV-16.00, requires the Regional Board use EPA's *Technical Support Document for Water Quality Based Toxics Control (TSD)* in assessing mixing zones. The TSD, page 70, defines a first stage of mixing, close to the point of discharge, where complete mixing is determined by the momentum and buoyancy of the discharge. The second stage is defined by the TSD where the initial momentum and buoyancy of the discharge are diminished and waste is mixed by ambient turbulence. The TSD goes on to state that in large rivers this second stage mixing may extend for miles. The TSD, Section 4.4, requires that if complete mix does not occur in a short distance mixing zone monitoring and modeling must be undertaken.

The State's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (SIP), Section 1.4.2.2, contains requirements for a mixing zone study which must be analyzed before a mixing zone is allowed for a wastewater discharge. Properly adopted state Policy requirements are not optional. The proposed Effluent Limitations in the proposed Permit are not supported by the scientific investigation that is required by the SIP and the Basin Plan.

SIP Section 1.4.2.2 requires that a mixing zone shall not:

1. Compromise the integrity of the entire waterbody.
2. Cause acutely toxic conditions to aquatic life.
3. Restrict the passage of aquatic life.
4. Adversely impact biologically sensitive habitats.
5. Produce undesirable aquatic life.
6. Result in floating debris.
7. Produce objectionable color, odor, taste or turbidity.
8. Cause objectionable bottom deposits.
9. Cause Nuisance.
10. Dominate the receiving water body or overlap a different mixing zone.
11. Be allowed at or near any drinking water intake.

Federal regulation 40 CFR Section 131.12 (a)(1) the Antidegradation Policy requires that: "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." The Central Valley Regional Board routinely grants mixing zones above the drinking water maximum contaminant level (MCL) for human health criteria despite that municipal and domestic supply is a designated beneficial use of the receiving stream. The designated beneficial use of drinking water is not protected within the reach of the stream, which is often established as some unknown length, contrary to 40 CFR 131.12.

Few mixing zones are adequately evaluated to determine whether the modeling exercise was in fact relevant or accurate, or monitored over time to assess the impacts of the mixing zone on the aquatic environment. The sampling of receiving waters often consists of analyzing one or two points where the mixing zone boundary is supposed to be – finding no pollution at the mixing zone boundary is often considered proof that mixing has been "successful" when in fact the sampling protocol might have missed the plume altogether.



The proposed Permit allows a mixing zone for constituents based on human health (Drinking water) rather than requiring treatment to meet end-of-pipe limitations. The Delta serves to convey the drinking water supply for over 25 million Californians via the State Water Project (SWP), Central Valley Project (CVP) and local projects and intakes. Through the SWP and CVP, the channels in the Delta are also used to supply the agricultural water supply for roughly 2 million acres of prime farmland. It is important to stress that the Delta is not the source per se for all SWP and CVP water, but that the Delta and the Sacramento River serve as a critical conduit for water supplies that are physically developed upstream. To comply with the Antidegradation Policy, the trade of receiving water beneficial uses for lower utility rates must be in the best interest of the people of the state and must also pass the test that the Discharger is providing BPTC. Although the use of mixing zones may lead to individual, short-term cost savings for the discharger, significant long-term health and economic costs may be placed on the rest of society. The required antidegradation finding, that allowing a mixing zone rather than requiring treatment to remove pollutants to levels that protect beneficial uses at the point of discharge, is in the best interest of the people of California can be made in good faith. It is doubtful that put to a vote that Californians would vote to allow drinking water to be incrementally degraded in favor of maintenance of Sacramento's low sewer rates. Californians have routinely voted for clean water and clean water bonds. An assessment of BPTC, and therefore compliance with the Antidegradation Policy, must assess whether treatment of the wastestream can be accomplished, is feasible, and not simply the additional costs of compliance with water quality standards. A BPTC case can be made for the benefits of prohibiting a mixing zone and requiring technologies that provide superior waste treatment and reuse of the wastestream. It is more likely that the allowance for a human health mixing zone may be considered a violation of the State Constitution which requires the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the mixing zone is a waste and unreasonable use of water which is not in the interest of the people and for the public welfare.

The 303(d) listing for the Sacramento-San Joaquin Delta includes: Chlorpyrifos, DDT, Diazinon, Exotic Species, Group A Pesticides, Mercury, Polychlorinated biphenyls (PCBs) and unknown toxicity. The proposed Permit allows for a chronic toxicity mixing zone. Obviously, an allowance for a mixing zone for toxic pollutants will add to the unknown toxicity in the Sacramento River. The Basin Plan states, "*Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.*" By definition, an allowance for chronic mixing means that chronic water quality objectives will be exceeded within the mixing zone. An allowance for a chronic mixing zone within the Sacramento River which is 303(d) listed for unknown toxicity does not meet the Basin Plan requirements for additional treatment to meet water quality objectives in the limited segment of the river.

Phthalates were detected in greater than 75% of approximately 2,540 urinary samples collected from participants of the National Health and Nutrition Examination Survey (NHANES). Exposure in the United States to diethyl phthalate, dibutyl phthalate or diisobutylphthalate, benzyl butyl phthalate, and di-(2-ethylhexyl) phthalate is widespread.<sup>1</sup>

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<sup>1</sup> Environmental Health Perspectives Volume 112, Number 3, March 2004, Urinary Levels of Seven Phthalate Metabolites in the U.S. Population from the National Health and Nutrition Examination Survey (NHANES) 1999-



Bis(2-ethylhexyl)phthalate, commonly abbreviated DEHP, is an organic compound. The chemical formula for DEHP is  $C_{24}H_{38}O_4$ . It possesses good plasticizing properties. Being produced on a massive scale by many companies, it has acquired many names and acronyms, including BEHP and di-2-ethylhexyl phthalate. Due to its suitable properties and the low cost, DEHP is widely used as a plasticizer in manufacturing of articles made of PVC. Plastics may contain 1% to 40% of DEHP. DEHP is also used as a hydraulic fluid and as a dielectric fluid in capacitors. DEHP is a colorless liquid with almost no odor.

Because of bis(2-ethylhexyl)phthalate's prevalence in the environment and the documented threats to human and aquatic life; on 30 December 2009 US Environmental Protection Agency (US EPA) issued an *Action Plan* to address the manufacturing, processing, distribution, and use of this phthalate.

Water quality standards for bis(2-ethylhexyl)phthalate were established in December 1992 in the National Toxics Rule (NTR), which was amended in 1999. On 18 May 2000, US EPA adopted the California Toxics Rule<sup>2</sup> (CTR). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The water quality standards for bis(2-ethylhexyl)phthalate are 1.8 ug/l for waters from which both water and aquatic organisms are consumed and 5.9 ug/l for non-drinking water sources as a thirty-day average. US EPA has revised their recommended Ambient Criteria<sup>3</sup> for bis(2-ethylhexyl)phthalate to 1.2 ug/l for waters from which both water and aquatic organisms are consumed and 2.2 ug/l for non-drinking water sources as a thirty day average. The proposed Permit allows a mixing zone for bis(2-ethylhexyl)phthalate and would establish a limitations at 13 ug/l as a daily maximum.

## Overview from US EPA's Phthalates Action Plan

### ***I. Overview***

*U.S. Environmental Protection Agency's (EPA's) current management plan includes the following eight phthalates: dibutyl phthalate (DBP), diisobutyl phthalate (DIBP), butyl benzyl phthalate (BBP), di-n-pentyl phthalate (DnPP), di(2-ethylhexyl) phthalate (DEHP), di-n-octyl phthalate (DnOP), diisononyl phthalate (DINP), and diisodecyl phthalate (DIDP). In developing this plan, EPA considered the toxicity of phthalates, their prevalence in the environment and their widespread use and human exposure.*

*Phthalates are produced in high volume, over 470 million pounds per year (EPA 2006). Manufacturers use them in numerous industrial and consumer products, primarily as plasticizers in poly(vinyl chloride) (PVC) products. Many phthalates can potentially lead to high exposure, both individually and together with other*

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2000, Manori J. Silva, Dana B. Barr, John A. Reidy, Nicole A. Malek, Carolyn C. Hodge, Samuel P. Caudill, John W. Brock, Larry L. Needham, and Antonia M. Calafat, Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

<sup>2</sup> <http://www.epa.gov/region09/water/ctr/index.html>

<sup>3</sup> <http://www.epa.gov/waterscience/criteria/wqctable/index.html>



*phthalates. They can often substitute for each other in products. They are used in medical applications and have been detected in food. A number of phthalates appear in biomonitoring surveys of human tissues, evidencing widespread human exposure (CDC 2009). Although exposure to phthalates can produce a variety of effects in laboratory animals, for certain phthalates the adverse health effects on the development of the male reproductive system are the most serious. Several studies have shown associations between phthalate exposures and human health (although no causal link has been established). Recent scientific attention is focusing on evaluating the cumulative effects of mixtures of phthalates in an exposed organism.*

*EPA is concerned about phthalates because of their toxicity and the evidence of pervasive human and environmental exposure to them. Thus, EPA intends to initiate action to address the manufacturing, processing, distribution in commerce, and/or use of these eight phthalates. EPA intends to take action as part of a coordinated approach with the Consumer Product Safety Commission (CPSC) and the Food and Drug Administration (FDA).*

#### **Excerpts from US EPA's Phthalates Action Plan**

- In response to a European ban on the use of some phthalates in toys and personal care products for children, plasticizers based on isosorbide esters were developed (Roquett, 2009). These plasticizers can cover a broad range of phthalate applications, such as adhesive, sealants, sinks, floor coverings, wall paper, and medical disposables. It is worth noting that isosorbide esters could be prepared under solvent-free conditions (Chalecki, 1997), providing an environmentally friendly approach to manufacturing.*
- The reproductive developmental effects observed in humans include shortened anogenital distance observed in newborn boys; and shortened pregnancy, lower sex and thyroid hormones, and reduced sperm quality observed in adults.*
- Of the 8 phthalates, BBP, DEHP, and DBP elicit the most toxicity to terrestrial organisms, fish, and aquatic invertebrates (EC, 2008a,; Staples et al. 1997). Ecotoxicity studies with these phthalates showed adverse effects to aquatic organisms with a broad range of endpoints and at concentrations that coincide with measured environmental concentrations. Toxic effects were observed at environmentally relevant exposures in the low ng/L to µg/L range (Oehlmann et al. 2008).*
- Some phthalates studied have been shown to affect reproduction and impair development in all studied animal groups. Most phthalates appear to act by interfering with the functioning of various hormone systems, but some phthalates have wider pathways of effects (Jobling et al. 1995). Effect*



*concentrations of phthalates in laboratory experiments are consistent with measured environmental concentrations (Oehlmann, et al., 2008).*

- *Phthalates are released to the environment from multiple sources including industrial releases, the disposal of manufacturing, processing and industrial wastes, municipal solid waste, land application of sewage sludge, and release from products containing phthalates. Only two (DBP and DEHP) of the 8 phthalates are listed on EPA's Toxics Release Inventory (TRI).list of toxic chemicals. The available release data for these two phthalates indicate that releases of phthalates can be expected to all primary environmental media.*
- *Due to their pervasive use and release, as well as its propensity for global transport, phthalates are found in most environmental media, for example ambient air, surface water, soil, sediment, etc (EC, 2003a-b; 2008a-b; NTP-CERHR, 2003 a-e; 2006). Aquatic organisms, fish and terrestrial animals have evident exposure to DEHP (EC 2008a; Staples et al. 1997).*
- *Phthalate exposures can produce a variety of adverse effects in laboratory animals; especially on the development of the male reproductive system, and therefore there are implications for human health. Animal data on the cumulative effect of mixtures of several phthalates showed an increase in the reproductive effects in the organism exposed. Phthalates are produced in high volume and they are used in numerous industrial and consumer products. Phthalates appear in biomonitoring surveys, such as NHANES, that provide evidence of widespread human exposure. Phthalates are also found in the environment and wildlife species. EPA is concerned with phthalates based on toxicity, particularly to the development of the male reproductive system, prevalence in the environment, widespread use and human exposure and recent work focusing on the potential cumulative effect of mixtures of phthalates.*
- *EPA intends to initiate rulemaking to add the 8 phthalates to the list under TSCA section 5(b)(4). Section 5(b)(4) authorizes the EPA to compile and keep current a list of chemicals it finds present or may present an unreasonable risk of injury to health or the environment. EPA intends to publish a notice of proposed rulemaking in autumn, 2010.*

The proposed Permit allows a mixing zone for bis(2-ethylhexyl)phthalate simply stating that: "Assimilative capacity is available for bis(2-ethylhexyl)phthalate in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBELs for bis(2-ethylhexyl)phthalate have been developed considering the allowance of human carcinogen dilution credits." The Delta serves to convey the drinking water supply for over 25 million Californians via the State Water Project (SWP), Central Valley Project (CVP) and local projects and intakes. The antidegradation policy requires a finding, that allowing a mixing zone rather than requiring treatment to remove pollutants to levels that protect beneficial uses at the point of discharge, is in the best interest of the people of California, this seems to be a steep slope with regard to bis(2-ethylhexyl)phthalate. The allowance for a mixing



zone for bis(2-ethylhexyl)phthalate appears to compromise the integrity of the entire waterbody contrary to the requirements of the SIP.

The mixing zone analysis does not discuss fish ingestion with regard to bis(2-ethylhexyl)phthalate despite that the proposed Permit cites that the point of discharge is heavily fished. Recall that the water quality standard for bis(2-ethylhexyl)phthalate is partially based of the ingestion of fish.

Pages F-39 through F-44 list the constituents for which the Regional Board is proposing to allow a mixing zone. Electrical conductivity is not listed as being granted a mixing zone. The wastewater discharge average EC level is 764  $\mu\text{mhos/cm}$  and the maximum observed EC was 960  $\mu\text{mhos/cm}$ . Clearly the discharge exceeds the MCLs for EC presenting a reasonable potential to exceed the water quality objective. The proposed permit contains a performance based annual average effluent limitation for EC of 840  $\mu\text{mhos/cm}$ . The proposed EC limitation clearly exceeds the agricultural water quality goal and the MCL for EC. The proposed Order fails to establish an effluent limitation for EC that are protective of the Chemical Constituents water quality objective.

The proposed Permit, page F-48, states that: *“Due to the site-specific conditions of the discharge, the Central Valley Water Board has used best professional judgment in determining the appropriate method for conducting the RPA for these non-priority pollutant salinity constituents. For conducting the RPA, the USEPA recommends using a mass-balance approach to determine the expected critical downstream receiving water concentration using a steady-state approach. This downstream receiving water concentration is then compared to the applicable water quality objectives to determine if the discharge has reasonable potential to cause or contribute to an in-stream excursion. This approach allows assimilative capacity and dilution to be factored into the RPA.”*

The Regional Board’s unique approach for determining reasonable potential can only be undertaken if a mixing zone is considered. The Regional Board cites “site-specific conditions” that would warrant such an approach but fails to define any unique conditions here. Basically this is a wastewater discharge into a river – nothing exotic except for the politics. The Regional Board’s cited approach for determining reasonable potential is contrary to the regulations. Mixing can only be considered after the reasonable potential has been conducted and an effluent limitation established.

A mixing zone, by definition, is an area where water quality standards are allowed to be exceeded. If water quality standards are known to be exceeded – there is obviously beyond a reasonable potential for the discharge to exceed the water quality standard. If the water quality standard is exceeded there is reasonable potential under 40 CFR 122.44 (d)(i). 40 CFR 122.44 (d)(i) requires that; “Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.” Clearly at the point of discharge the discharge of 960  $\mu\text{mhos/cm}$  exceeds the agricultural goal of 700  $\mu\text{mhos/cm}$ , the drinking water MCL of 900  $\mu\text{mhos/cm}$  and the salinity



standards for the Delta contained in the Basin Plan. There is beyond a reasonable potential for the discharge to exceed water quality standards for EC, they are exceeded by the discharge. An EC effluent limitation is mandated by federal regulation and the proposed Permit must be amended accordingly.

The proposed permit, Page F-73, states that: "...in addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge." The mixing zone has not been defined for salinity. The size of the mixing zone has not been defined. It is reasonable to assume that since there are numerous irrigation intakes within 1 to 2 miles of the discharge that the intakes would be impacted by inadequately diluted wastewater containing EC above the agricultural goal. The proposed mixing zone for salinity has not met any of the requirements in the SIP or the Basin Plan.

The Sacramento River near the diffuser is a popular sport fishing area. In addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge<sup>2</sup>. Based upon information submitted by SRCSD, the typical construction of the agricultural irrigation water intakes in the vicinity of the outfall would draw water from near the bank of the river, below the water surface (deep enough to not go dry during low river levels, but far enough from the river bottom to not be impacted by bottom sediments). It appears that undiluted effluent will not be drawn into the agricultural intakes, but varying mixtures of effluent and river water will be diverted from the partially mixed discharge plume." (Permit, Page F-73) The SRCSD requested acute and chronic aquatic life dilution credits for ammonia, copper, cyanide, and chlorpyrifos. Human carcinogen dilution credits were requested for carbon tetrachloride, chlorodibromomethane, dichlorobromomethane, methylene chloride, tetrachloroethylene, pentachlorophenol, bis(2-ethylhexyl)phthalate, dibenzo(a,h)anthracene, 1,2-diphenyl-hydrazine, and N-nitrosodimethylamine. Additionally, human health dilution credits were requested for manganese, nitrate, and MTBE. Mixing zone analyses have generally been limited to whether a constituent causes harm to crop yield or produces toxic effects to plants. Recently there has been significant discussion of food safety and the health effects from plant uptake of pollutants in irrigation water. Although much of the discussion revolves around reclamation with treated sewage, the irrigation intakes in the Sacramento River may provide an equal level of exposure. The proposed Permit discusses consultation with the Department of Public Health (DPH), but that discussion appears to have been limited to pathogens; food safety was not assessed. Again, it does not appear that the interests of the people of California are best served by allowing a mixing zone for the discharge of chemicals known to cause harm to human health to nearby farmland. The proposed Permit does not discuss plant uptake and associated human health impacts from irrigation of crops with water extracted from within the mixing zone. The proposed Permit also fails to cite whether the impacted farmers using this irrigation water were notified of the mixing zone allowance and the associated chemicals may be in their irrigation water. Nuisance is defined in the California Water Code as anything which is injurious to health, indecent, offensive or an obstruction of the free use of property which affects an entire community and occurs as a result of the treatment or disposal of waste. The allowance for a mixing zone three miles long in which there are at least 20 agricultural intakes could impact the entire local agricultural community based on the potential health impacts from crop uptake of pollutants and the free use of the farmers property. Certainly any farmers growing organic crops



could be directly impacted by using irrigation water exceeding water quality objectives which is allowed within the mixing zone.

Many pharmaceuticals and personal care products (PPCPs) are commonly found in biosolids and effluents from wastewater treatment plants. Land application of these biosolids and the reclamation of treated wastewater can transfer those PPCPs into the terrestrial and aquatic environments, giving rise to potential accumulation in plants. (Uptake of Pharmaceutical and Personal Care Products by Soybean Plants from Soils Applied with Biosolids and Irrigated with Contaminated Water Chenxiwu, Alison Spongberg, Jason Witter, Minfang and Kevin Czajkowski; *Department of Environmental Sciences, and Department of Geography and Planning, University of Toledo, Toledo, Ohio 43606 Received April 8, 2010. Revised manuscript received June 25, 2010. Accepted July 12, 2010.*) The impacts to irrigated agriculture have not been adequately assessed with regard to the proposed mixing zone.

Water quality criteria for the protection of freshwater aquatic life are generally established on a 1-hour and a 4-day basis for acute and chronic toxic effects, respectively. It is a requirement in the TSD that it be shown that aquatic life does not remain resident within the mixing zone for 1-hour to prevent acute toxicity and 4-days for chronic impacts. There is nothing in the proposed Permit addressing the amount of time and the methods for assessment for aquatic life to migrate through the mixing zone. The primary mixing area is commonly referred to as the zone of initial dilution, or ZID. Within the ZID acute aquatic life criteria are exceeded. To satisfy the CWA prohibition against the discharge of toxic pollutants in toxic amounts, regulators assume that if the ZID is small, significant numbers of aquatic organisms will not be present in the ZID long enough to encounter acutely toxic conditions. EPA recommends that a ZID not be located in an area populated by non-motile or sessile organisms, which presumably would be unable to leave the primary mixing area in time to avoid serious contamination. The proposed Permit does not address populations of non-motile or sessile organisms within the mixing zone. The US Fish and Wildlife Service commented that: "We are also concerned about potential aquatic life attraction impacts from the discharge plume. Various species can be drawn to discharge plumes for various reasons, including feeding and temperature and flow refuge. This attraction can result in impacts from related effluent toxicity and predation. The discharge area's identity as a popular fishing location also suggests an association between the discharge plume and possible predator attraction." The proposed Permit does not show that aquatic life passes through the mixing zone in a time to prevent toxicity, such is required by the TSD, which in turn is required by the Basin Plan.

The SIP requires a mixing zone not restrict the passage of aquatic life. The proposed Permit contains the following statements regarding the accommodations for the passage of fish:

- The chronic aquatic life mixing zone is 400 feet wide and extends 350 feet downstream of the diffuser.
- The Sacramento River is approximately 600 feet wide at the surface. The chronic mixing zone is approximately 400 ft x 350 ft.
- The size of the zone of passage varies on either side of the river depending on the river geometry.



- The surface of the river is approximately 600 feet across and the bottom of the river is approximately 400 feet across.
- Based on the model the zone of passage at the surface of the river is generally at least 100 feet on both sides of the river, while the zone of passage at the bottom of the river is greater than 40 feet from both sides of the river.

It is stated in the mixing zone analysis discussion in the proposed Permit that the mixing zone is 400 feet across, the same width as the river bottom, with the water surface being 600 feet across. Since the width of the mixing zone is the same as the width of the river bottom, we are to assume that the pollutant stream is not heavier than water and floats somewhere between the bottom and top of the river. In reality, some pollutants are heavier than water and sink while other pollutants are lighter and tend to float. The temperature of the waste will also impact the location of the mixing zone; warmer water tending to be more buoyant. The dye used to confirm that there is a passage for fish would tend to have the same characteristics throughout and tend to stay together. It makes no sense that the mixing zone is 400 feet wide and the river bottom is 400 feet wide and that there is a zone of passage at the bottom of at least 40 feet unless the plume is always buoyant, there are no pollutants that are heavier than water, such as saline water. The Sacramento River at Freeport is within the designated critical habitat for 5 federally-listed fish species including winter- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), delta smelt (*Hypomesus transpacificus*) and green sturgeon (*Acipenser medirostris*). The zone of passage for critical habitat is unacceptably small and the proposal for an allowance for a chronic mixing zone should be prohibited.

Tetra Tech was tasked to review the Sacramento Regional County Sanitation District's dynamic modeling study for the Sacramento Regional Wastewater Treatment Plant. Tetra Tech submitted a final review memorandum to the Regional Board dated 30 June 2008. "Some phenomena were observed in the field that were not reproduced in the model, most notably a region of high dye concentration near the eastern river bank just downstream from the diffuser in the October 2005 dye release. The subsequent November 2006 dye release was conducted in an effort to further resolve this observed behavior, however the model failed in all cases to reproduce this high concentration region." (pages 9 and 10) It was not discussed that the area close to the river banks are defined as providing a bypass for fish – obviously, the dye shows the effluent plume at the bank. This is simply discussed as an anomaly; fish bypass was not addressed. This would confirm that there is no area of bypass for fish.

In justifying that the mixing zone *shall not cause acutely toxic conditions to aquatic life passing through the mixing zone*, the proposed Permit states that: "The chronic mixing zone does not allow acute aquatic life criteria to be exceeded and this Order requires acute bioassays to be conducted using 100% effluent. Compliance with these requirements ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur." The bioassays, according to the US Fish and Wildlife Service (15 June 2010) are not using the most sensitive species. The Discharger has routinely failed bioassays without apparent penalty or any requirement for corrective action. Bioassays are also not run continuously. Requiring bioassay sampling is not an assurance that toxic conditions are prohibited or prevented.



Copper and lead act on aquatic organisms in the same fashion. Therefore, additive toxicity for these constituents must be considered. The Basin Plan, at (IV-17.00), states the following:

*“Where multiple toxic pollutants exist together in water, the potential for toxicological interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and effluent data to determine whether there is reasonable potential for interactive toxicity. Pollutants which are carcinogens or which manifest their toxic effects on the same organ systems or through similar mechanisms will generally be considered to have potentially additive toxicity. The following formula will be used to assist the Regional Water Board in making determinations:*

$$\sum_{i=1}^n \frac{[\text{Concentration of Toxic Substance}]}{[\text{Toxicologic Limit for Substance in Water}]} < 1.0$$

*The concentration of each toxic substance is divided by its toxicologic limit. The resulting ratios are added for substances having similar toxicologic effects and, separately, for carcinogens. If such a sum of ratios is less than one, an additive toxicity problem is assumed not to exist. If the summation is equal to or greater than one, the combination of chemicals is assumed to present an unacceptable level of toxicological risk. For example, monitoring shows that ground water beneath a site has been degraded by three volatile organic chemicals, A, B, and C, in concentrations of 0.3, 0.4, and 0.04 µg/l, respectively. Toxicologic limits for these chemicals are 0.7, 3, and 0.06 µg/l, respectively. Individually, no chemical exceeds its toxicologic limit. However, an additive toxicity calculation shows:*

$$\frac{0.3}{0.7} + \frac{0.4}{3} + \frac{0.04}{0.06} = 1.2$$

*The sum of the ratios is greater than unity (>1.0); therefore the additive toxicity criterion has been violated. The concentrations of chemicals A, B, and C together present a potentially unacceptable level of toxicity.”*

Additive toxicity has not been considered in the proposed Permit but has the potential to result in the take of endangered species within the mixing zone and potentially beyond.

The City of Rio Vista NPDES permit states that: “The Sacramento River in the vicinity of the discharge is tidally influenced, resulting in flow reversals. With flow reversals, some volume of river water is multiple dosed with the effluent as the river flows downstream past the discharge, reverses moving upstream past the discharge a second time, then again reverses direction and passes the discharge point a third time as it moves down the river. A particular volume of river water may move back and forth, past the discharge point many times due to tidal action, each time receiving an additional load of wastewater.” Rio Vista is downstream from the subject wastewater treatment plant. Flow reversals and multi-dosing of pollutants are not discussed in the proposed Permit’s mixing zones.



The proposed Permit, page F-34 states that: “The SRWTP discharge is considered an incompletely-mixed discharge, so the Discharger conducted a mixing zone study. A mathematical dynamic model was developed by Flow Sciences Inc. and consists of five models linked in series, with the output from previous models used as part of the inputs to subsequent models.” The proposed Permit then states that infield verification of the model was conducted; but fails to discuss the verification sampling results or the percentage error. The proposed Permit further states that the model is proprietary and transmittal for verification to the Regional Board was not allowed. Each model would be assessed with an acceptable error. There is no discussion of whether the acceptable errors are additive from each of the models. It has been ten years since this NPDES permit has been renewed which should have allowed for a significant sampling database to be assembled supporting the model, no such discussion is presented in the proposed Permit. We know of no models that are capable of assessing tidal flow reversals in rivers and tidal reversals are not discussed in the proposed Permit. Unfortunately, the proposed Permit fails to provide any information that provides any documentation of the accuracy of the model and the modeled results.

**18. The proposed Permit contains Effluent Limitations less stringent than the existing permit, contrary to the Antibacksliding requirements of the Clean Water Act and Federal Regulations, 40 CFR 122.44 (l)(1).**

Under the Clean Water Act (CWA), point source dischargers are required to obtain federal discharge (NPDES) permits and to comply with water quality based effluent limits (WQBELs) in NPDES permits sufficient to make progress toward the achievement of water quality standards or goals. The antibacksliding and antidegradation rules clearly spell out the interest of Congress in achieving the CWA’s goal of continued progress toward eliminating all pollutant discharges. Congress clearly chose an overriding environmental interest in clean water through discharge reduction, imposition of technological controls, and adoption of a rule against relaxation of limitations once they are established.

Upon permit reissuance, modification, or renewal, a discharger may seek a relaxation of permit limitations. However, according to the CWA, relaxation of a WQBEL is permissible only if the requirements of the antibacksliding rule are met. The antibacksliding regulations prohibit EPA from reissuing NPDES permits containing interim effluent limitations, standards or conditions less stringent than the final limits contained in the previous permit, with limited exceptions. These regulations also prohibit, with some exceptions, the reissuance of permits originally based on best professional judgment (BPJ) to incorporate the effluent guidelines promulgated under CWA §304(b), which would result in limits less stringent than those in the previous BPJ-based permit. Congress statutorily ratified the general prohibition against backsliding by enacting §§402(o) and 303(d)(4) under the 1987 Amendments to the CWA. The amendments preserve present pollution control levels achieved by dischargers by prohibiting the adoption of less stringent effluent limitations than those already contained in their discharge permits, except in certain narrowly defined circumstances.

When attempting to backslide from WQBELs, under either the antidegradation rule or an exception to the antibacksliding rule, relaxed permit limits must not result in a violation of applicable water quality standards. The general prohibition against backsliding found in



§402(o)(1) of the Act contains several exceptions. Specifically, under §402(o)(2), a permit may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant *if*:

- (A) material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;
- (B)(i) information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or
- (ii) the Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B) of this section;
- (C) a less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy [(e.g., Acts of God)];
- (D) the permittee has received a permit modification under section 1311(c), 1311(g), 1311(h), 1311(i), 1311(k), 1311(n), or 1326(a) of this title; or
- (E) the permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit, and has properly operated and maintained the facilities, but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).

Even if a discharger can meet either the requirements of the antidegradation rule under §303(d)(4) or one of the statutory exceptions listed in §402(o)(2), there are still limitations as to how far a permit may be allowed to backslide. Section 402(o)(3) acts as a floor to restrict the extent to which BPJ and water quality-based permit limitations may be relaxed under the antibacksliding rule. Under this subsection, even if EPA allows a permit to backslide from its previous permit requirements, EPA may never allow the reissued permit to contain effluent limitations which are less stringent than the current effluent limitation guidelines for that pollutant, or which would cause the receiving waters to violate the applicable state water quality standard adopted under the authority of §303.49.

Federal regulations 40 CFR 122.44 (l)(1) have been adopted to implement the antibacksliding requirements of the CWA:

- (l) Reissued permits. (1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under Sec. 122.62.)



- (2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.
- (i) Exceptions--A permit with respect to which paragraph (1)(2) of this section applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant, if:
  - (A) Material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;
  - (B)(1) Information is available which was not available at the time of permit Issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or (2) The Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b);
  - (C) A less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;
  - (D) The permittee has received a permit modification under section 301(c), 301(g), 301(h), 301(i), 301(k), 301(n), or 316(a); or
  - (E) The permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).
- (ii) Limitations. In no event may a permit with respect to which paragraph (1)(2) of this section applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, issued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 303 applicable to such waters.



The proposed Permit, page states that:

“3. Satisfaction of Anti-Backsliding Requirements

The effluent limitations in this Order are at least as stringent as the effluent limitations in the existing Order, with the exception of effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. The effluent limitations for these pollutants are less stringent than those in Order No. 5-00-188. This relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

Order No. 5-00-188 included effluent limitations for chloroform, lindane, silver, lead, zinc and cyanide. Based on monitoring data collected from June 2005 – July 2008, the discharge does not indicate reasonable potential to exceed water quality objectives for chloroform, lindane, silver, lead and zinc. Therefore, effluent limitations for these parameters were not included in this Order. The lack of effluent limitations in this Order does not constitute backsliding.

Order No. 5-00-188 established effluent limitations for cyanide of 10.8 µg/L as a daily average with a trigger of 6.1 µg/L. The cyanide limitation of 10.8 µg/L was based on the MEC of 9.0 µg/L times a safety factor of 1.2 (which was proposed by the Discharger and accepted by the Central Valley Water Board). A trigger concentration exceedance results in an investigation and Central Valley Water Board notification with the Central Valley Water Board may require an action plan to address the cause of the exceedance. The Central Valley Water Board found that the trigger concentration would be protective and appropriate if established as the 95th percentile value assuming that historical data follows a lognormal probability distribution which was 6.1 mg/L. The Discharger performed a dynamic model for cyanide which resulted in a chronic LTA of 13.9 mg/L. The calculated limit is 11.0 mg/L as an AMEL with a MDEL of 22.0 mg/L. As discussed in Section IV.C.2.d, the dynamic model represents a more accurate picture of the mixing zone concentrations. This Order relaxes the effluent limitation for cyanide from Order No. 5-00-188. The dynamic model data submitted by the Discharger is considered new information by the Central Valley Water Board.

Order No. 5-00-188 established effluent limitations for oil and grease. As discussed further in section IV.C.3, monitoring data over the term of Order No. 5-00-188 indicated that the discharge no longer exhibits reasonable potential to exceed water quality objectives for oil and grease. Therefore, the effluent limitation is not retained in this Order. The monitoring data submitted by the Discharger is considered new information by the Central Valley Water Board.

The revision of the cyanide limitation and the removal of effluent limitations for oil and grease, chloroform, lindane, silver, lead and zinc are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Any impact on existing water quality will be insignificant.”

The proposed Permit fails to cite any of the exceptions to Federal regulations 40 CFR 122.44 (l)(1) in relaxing the permit and removing limitations. The removal of limitations rests solely on



continued monitoring, not new information as defined in the regulation. There was no substantial modification to the treatment system or the character of the wastestream that justifies removal of the limitations. With regard to silver, lead and zinc, contrary to the statements regarding “new” information, the removal of limitations was based on the use of the effluent, rather than the ambient instream hardness, in determining reasonable potential that resulted in the Regional Board’s removal of the limitations. The statement that “any impact on existing water quality will be insignificant” is incorrect if the removal of metal limitations results in toxicity during periods of low ambient hardness. The Regional Board fails to cite a proper exemption to the Antidegradation regulation and fails to provide any substance to support their claim that the impact on water quality will be insignificant.

**19. The proposed Permit carries forth a Thermal Plan exemption that degrades the aquatic life beneficial use of the receiving stream, the Sacramento River.**

The proposed Permit contains the following Effluent Limitation:

“e. Temperature. The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than 20°F from 1 May through 30 September and more than 25°F from 1 October through 30 April.”

The proposed Permit contains the following Receiving Water Limitations:

“15. Temperature.

a. If the natural receiving water temperature is less than 65°F, the discharge shall not create a zone, defined by water temperature of more than 2°F above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

b. If the natural receiving water temperature is 65° F or greater, the discharge shall not create a zone, defined by a water temperature of 1° F or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

The following is a reproduction of the proposed Permit Table F-16.

<b>Thermal Plan Requirements (Section 5.A.(1)a-c)</b>	<b>Existing NPDES Permit Requirements (181 mgd discharge)</b>	<b>SRCSO Proposed NPDES Requirements (181 mgd)</b>
<b>5.A.(1)a</b> The maximum effluent temperature shall not exceed the natural receiving water temperature by more than 20 ° F	The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than: 25 ° F from 1 October through 30 April; -or- 20° F from 1 May through 30 September <i>(meets Thermal Plan requirements)</i>	The daily average temperature of the effluent shall not exceed the daily average natural receiving water temperature by more the 20° F 1 April through 30 September, or by more the 25° F 1 October through 31 March
<b>5.A.(1)b</b> Elevated temperature waste	If the natural receiving water temperature is less than 65° F: The	The discharge shall not create a zone, defined by water temperatures



discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1° F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.	discharge shall not create a zone, defined by water temperature of more than 2° F above the natural receiving water temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution. If the natural receiving water temperature is 65° F or greater: Meets Thermal Plan requirements at any point outside the zone of initial dilution.	of more than 2.5° F above natural receiving water temperature, which exceeds 50 percent of the cross-sectional area of the river at any point, evaluated as a daily average.
<b>5.A.(1)c</b> No discharge shall cause a surface water temperature rise greater than 4° F above the natural temperature of the receiving waters at any time or place.	No Exception ( <i>Meets Thermal Plan Requirements</i> )	The discharge shall not cause a surface water temperature rise greater than 4° F above the natural temperature of the river at any time or place.

Thermal Plan compliance:

Page F-92 of the proposed Permit states that:

“Based on the dynamic model results for the effluent, the limitations appear to put the Discharger in immediate non-compliance. New or modified control measures may be necessary in order to comply with the effluent limitations, and the new or modified control measures cannot be designed, installed and put into operation within 30 calendar days. Furthermore, the effluent limitations for temperature are a new regulatory requirement within this permit, which becomes applicable to the waste discharge with the adoption of this Order, which was adopted after 1 July 2000. Therefore, a compliance time schedule for compliance with the temperature effluent limitations is established in TSO No. R5-2010-XXXX in accordance with CWC section 13300, that requires preparation and implementation of a pollution prevention plan in compliance with CWC section 13263.3.”

Page F-79 of the proposed Permit states that:

“As a condition of Waste Discharge Order No. 5-00-188, the Discharger completed and submitted a study assessing the thermal impacts of its discharge in the Sacramento River to the National Marine Fisheries Services (NMFS), titled “Thermal Effects of Sacramento Regional Wastewater Treatment Plant Discharges on Migrating Fishes of the Sacramento River, February 2005.” This thermal impact assessment recommended continuation of the existing thermal plan exemptions. The 2005 Thermal Study was previously reviewed by NMFS staff and they did not indicate any concerns with the proposed Thermal Plan exception. Since this time, however, conditions under which the evaluation was made have changed. There has been a significant pelagic organism decline in the Delta, new species are threatened and there has been a change in the diffuser configuration. In



December 2009, the Discharger requested revised changes to their Thermal Plan exemption. In June 2010, the Discharger in a letter to the Central Valley Water Board withdrew its request for an expanded wastewater treatment plant. Due to these changes the Discharger prepared a new study, “Thermal Plan Exception Justification for the Sacramento Regional Wastewater Treatment Plant”, July 2010. With this revised July 2010 study, new thermal plan exemptions were requested.”

It is somehow amazing that it takes a model to determine that the Discharger is in non-compliance with the discharge limitations for temperature. The proposed Limitation for temperature in the proposed Permit is the same as the existing NPDES permit, Order No. 5-00-188. This is not a “new” effluent limitation. Has the Discharger not conducted temperature sampling? Have the data not been reviewed? Is the Discharger not required to assess compliance and report, to the Regional Board, instances of non-compliance? Is the Effluent Limitation for temperature not subject to mandatory minimum penalties under the California Water Code for Effluent Limitation violations?

The California Department of Fish and Game has stated that manmade flows such as effluent discharges attract fish. The Fish and Wildlife Services have stated that some fish larvae could be expected in the vicinity of the city of Sacramento during February-June and during the larval stage delta smelt are the most vulnerable to zones of poor water quality or high water temperature due to their reduced mobility. There has been a significant pelagic organism decline in the Delta and new species are threatened. And, with all this said, the Regional Board is recommending in the proposed Permit to continue the thermal plan exemption for the Sacramento Regional wastewater treatment plant. The Regional Board’s required study sounds like the numerous studies that have already been completed in the decade since the last permit was adopted. Instead, the Regional Board should be investigating whether the thermal discharges from the Sacramento Regional wastewater treatment plant are, at a minimum, contributing to toxicity within the receiving stream.

It’s somewhat amazing that following more than a decade of studies that even the most basic of information regarding the impacts of Sacramento County’s thermal waste discharge is unknown. Each of the studies is contrary to comments and recommendations by the agencies with expertise in fisheries. As follows, another model says there is a zone of passage for fish yet the experts say that wastewater discharges are attractive to fish and that young fish do not have the mobility to avoid dangers. The agency comments are not new information, but all the Regional Board gets is more modeling and no real life data or information. A continued lack of information after a decade of studies, and the proposed Permit requires more studies.

Page F-80 of the proposed Permit states the following with regard to a thermal zone of passage for fish:

“The July 2010 thermal plan exception justification study is based on the dynamic model for temperature performed by Flow Science. The modeled temperature plumes show a zone of passage at the surface of the Sacramento River approximately 75-100 feet wide on the west bank and 175-200 feet wide on the east bank. The surface width of the river at the diffuser is 600 feet. The zone of passage at the bottom of the river is smaller due to



the configuration of the west bank. The study concluded that both surface water swimming fish and bottom water swimming fish would avoid the heated plume by swimming around or on top of it.”

In a 15 June 2010 letter to Kenneth Landau at the Regional Board the Director of the California Department of Fish and Game stated with regard to the thermal plume from the Sacramento Regional WWTP:

“Department Fisheries Biologists have stated in previous comments to the Regional Board that manmade flows such as effluent discharge attract fish. The Department supports USEPA findings and recommends that acute and/or chronic mixing zones not be allowed and that conditions be set to meet Basin Plan Objectives allowing for no toxicity in the discharge.”

In a 15 June 2010 letter to the Regional Board the US Fish and Wildlife Service stated:

“Delta smelt enter the Sacramento River and Deep Water Ship Channel from late December to June to spawning in temperatures between 12-18 C. spawning on the mainstem of the Sacramento River may occur particularly during years of low freshwater discharge. Delta smelt critical habitat in the Sacramento River extends north to the confluence with the American River. Pre-spawning adults could be expected in the vicinity of the city of Sacramento from the latter part of December through June. Some larvae could be expected in the vicinity of the city of Sacramento during February-June. During the larval stage delta smelt are the most vulnerable to zones of poor water quality or high water temperature due to their reduced mobility.”

The Thermal Plan exception has resulted in a situation where the aquatic life beneficial use in the Delta is degraded to the point that recover is questionable. Increased thermal discharges are another stress. Clearly the evidence submitted by the fishery agencies is contrary to the models submitted by consultants hired by the Discharger. With the Delta in significant decline and more aquatic life failures the proposed Permit should implement a new approach and error on the side of water quality and implement the Thermal Plan without exception.

**20. The proposed Permit fails to assess compliance and require compliance with and the Receiving Water Limitation for Toxicity, which is based on the Basin Plan narrative toxicity water quality objective.**

The proposed Permit contains Receiving Water Limitation No. 16 which requires that the wastewater discharge not cause: “Toxic substances to be present, individually or in combination, in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.” An identical Receiving Water Limitation is contained in the existing NPDES permit for the Sacramento Regional County Sanitation District.

Threatened violation:



The increasing production and use of pharmaceuticals and personal care products (PPCPs) – some of which may be endocrine disrupting compounds (EDCs) – have led to a growing concern about the occurrence of these compounds in the environment. Recent studies have reported the occurrence worldwide of EDCs, PPCPs, and other organic wastewater contaminants (OWCs) – collectively referred to as “constituents of emerging concern” (CECs) or “emerging constituents” (ECs) – in wastewater treatment plant (WWTP) effluents, surface waters used as drinking water supplies, and in some cases, finished drinking waters. Of the 126 samples analyzed for the project, one sample (American River at Fairbairn drinking water treatment plant [DWTP] intake collected in April 2008) had no detectable levels of any EDCs, PPCPs, or OWCs. All other samples had one or more analytes detected at or above the corresponding MRLs. The five most frequently detected PPCPs were caffeine, carbamazepine, primidone, sulfamethoxazole, and tris(2-chloroethyl) phosphate (TCEP). At the sample sites upstream of WWTP discharges in all three watersheds, the concentrations of selected PPCPs, except for caffeine, were low (i.e.,  $\leq 13$  ng/L), pointing to WWTP discharges as the main source of most PPCPs and OWCs in the environment. (Source, Fate, and Transport of Endocrine disruptors, Pharmaceuticals, and Personal Care Products in Drinking Water Sources in California, National Water Research Institute Fountain Valley, California, May 2010)

Over the last 10 years, reports of feminized wildlife have fueled chilling headlines. Most of these reports have focused on the many ways that estrogen in sewage effluent can distort normal male development. Now a new study reveals one way that the hormone pollutant can affect females: Too much estrogen causes subtle changes in female fish's courting behavior, which could alter a population's genetic makeup (Environ. Sci. Technol., DOI: [10.1021/es101185b](https://doi.org/10.1021/es101185b)).

Increase in intersex fish downstream from WWTP possibly associated with endocrine-active contaminants. (Boulder Colorado, Colorado University, 2008)

Skewed sex ratio downstream from WWTP possibly associated with endocrine-active contaminants. (Boulder Colorado, Colorado University, 2006)

Fluoxetine (FLX), Sertraline (SER) and their degradates NFLX, and NSER were the primary antidepressants in brain tissue samples. Little or no venlafaxine (VEN), the dominant antidepressant in both water and bed sediment, was present. Degradates were measured at higher concentrations in brain samples than parent compounds. (Boulder Creek, Colorado & Fourmile Creek, Iowa, the College of Wooster, 2010)

SAR sites (with WWTP or urban runoff influent) males had significantly lower Testosterone (T) than the reference site males. Males from SAR sites had significantly higher 17 $\beta$ -estradiol (E2) than reference site. Females from SAR sites had significantly lower E2 than the reference site females. (USGS, Santa Ana River (SAR) SAR sites, 2009)

“Several recent studies have documented endocrine disruption in Delta fish. One of the biomarkers of EDCs is intersex fish, fish with both male and female reproductive organs. A recent histopathological evaluation of delta smelt for the Pelagic Organism Decline



found 9 of 144 maturing delta smelt (6%) collected in the fall were intersex males. This study provides evidence that delta smelt are being exposed to EDCs. Brander and Cherr (2008) observed choriogenin induction in male silversides from Suisun Marsh. Riordan and Adam (2008) reported endocrine disruption in male fathead minnows following in-situ exposures below the Sacramento Regional Treatment Plant. Lavado, et al. (in press) conducted studies in 2006 and 2007 to evaluate the occurrence and potential sources of EDCs in Central Valley waterways. In their study, estrogenic activity was repeatedly observed at 6 of 16 locations in the Bay-Delta watershed, including in water from the Lower Napa River and Lower Sacramento River in the Delta. Further studies are needed to identify the compounds responsible for the observed estrogenic activity and their sources.” (Alameda County Water District, Alameda County Flood Control and Water Conservation District, Zone 7, Metropolitan Water District of Southern California, San Luis & Delta-Mendota Water Authority, Santa Clara Valley Water District, State Water Contractors, June 1, 2010)

A recent study by the Toxic Substances Hydrology Program of the U.S. Geological Survey (USGS) shows that a broad range of chemicals found in residential, industrial, and agricultural wastewaters commonly occurs in mixtures at low concentrations downstream from areas of intense urbanization and animal production. The chemicals include human and veterinary drugs (including antibiotics), natural and synthetic hormones, detergent metabolites, plasticizers, insecticides, and fire retardants. One or more of these chemicals were found in 80 percent of the streams sampled. Half of the streams contained 7 or more of these chemicals, and about one-third of the streams contained 10 or more of these chemicals. This study is the first national-scale examination of these organic wastewater contaminants in streams and supports the USGS mission to assess the quantity and quality of the Nation's water resources. A more complete analysis of these and other emerging water-quality issues is ongoing. Knowledge of the potential human and environmental health effects of these 95 chemicals is highly varied; drinking-water standards or other human or ecological health criteria have been established for 14. Measured concentrations rarely exceeded any of the standards or criteria. Thirty-three are known or suspected to be hormonally active; 46 are pharmaceutically active. Little is known about the potential health effects to humans or aquatic organisms exposed to the low levels of most of these chemicals or the mixtures commonly found in this study. ("Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A national reconnaissance," an article published in the March 15, 2002 issue of *Environmental Science & Technology*, v. 36, no. 6, pages 1202-1211. Data are presented in a companion USGS report, "Water-quality data for pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000" (USGS Open-File Report 02-94). These and other reports, data, and maps can be accessed on the Internet at <http://toxics.usgs.gov>.)

PPCPs are found where people or animals are treated with drugs and people use personal care products. PPCPs are found in any water body influenced by raw or treated sewage, including rivers, streams, ground water, coastal marine environments, and many drinking water sources. PPCPs have been identified in most places sampled. The U.S. Geological Survey (USGS) implemented a national reconnaissance to provide baseline information



on the environmental occurrence of PPCPs in water resources. You can find more information about this project from the USGS's What's in Our Wastewaters and Where Does it Go? site. PPCPs in the environment are frequently found in aquatic environments because PPCPs dissolve easily and don't evaporate at normal temperature and pressures. Practices such as the use of sewage sludge ("biosolids") and reclaimed water for irrigation brings PPCPs into contact with the soil.  
(<http://www.epa.gov/ppcp/faq.html#ifthereareindeed>)

From the recent scientific investigations and literature it is reasonable to conclude that "constituents of emerging concern" (CECs) are present in the wastewater discharge from the Sacramento Regional wastewater treatment plant. It is also reasonable to conclude that the wastewater discharge contains CECs in concentrations that at a minimum threaten to violate the Receiving Water Limitation for toxicity, which prohibits toxic substances to be present in concentrations that produce detrimental physiological responses in human or aquatic life. The proposed Permit is silent with regard to CECs except to state that requiring filtration may reduce their quantity in the wastewater discharge. Monitoring for CECs in the wastewater discharge, in the receiving stream (the Sacramento River) or in agricultural diversions taken from within the proposed mixing zones is not required in the proposed Permit. It is undoubted that the Regional Board's response will be that the individual chemical pollutants do not have promulgated water quality standards and monitoring for CECs would therefore be unproductive. However, the Regional Board has an obligation to require an investigation of the potential violation of the Receiving Water Limitation for Toxicity. The Discharger is also required to assess compliance with all limitations and report any instances of non-compliance with limitations, including Receiving Water Limitations. The Regional Board is also, by 40 CFR 122.44, required to develop Effluent Limitations if the discharge presents a reasonable potential to exceed a water quality standard, including the narrative toxicity objective.

US EPA has compiled a database; *Treating Contaminants of Emerging Concern A Literature Review Database* (August 2010). Local wastewater treatment system design Engineers, such as Dr. Robert Emerick, have also been testing treatment system capabilities for removing CECs. There appear to be treatment technologies that are capable of removing significant levels of CECs.

At a minimum, the proposed Permit should include a requirement for a study of the presence of CECs in the wastewater discharge, the receiving stream and in agricultural intakes within the proposed 3 mile mixing zone and the effectiveness of different treatment technologies to remove CECs. The report should be made available to the public. At a time when the proposed Permit will likely require advanced treatment systems to be designed and constructed; investigating the technologies that are capable of removing CECs would make sense economically and environmentally.

**21. The Basis for the proposed nitrate Effluent Limitation is not presented in the Fact Sheet as required by 40 CFR 124.8.**



The proposed Permit contains an Effluent Limitation for nitrate of 0.26 mg/l as a monthly average. The proposed Permit states that the nitrate limitation is based on the Discharger's study prepared by Larry Walker Associates, titled, "Technical Memorandum: Analysis of Costs and Benefits of Advanced Treatment Alternatives for the Sacramento Regional Wastewater Treatment Plant," dated May 2010. The proposed Permit fails however to cite whether the limitation is based on water quality impacts, protection of beneficial uses, proposed treatment system capabilities or antidegradation. This is relevant as our experience is that current locally utilized treatment systems appear rarely capable of denitrification producing a level of nitrate below 2 mg/l.

**22. The proposed Permit contains an inadequate antidegradation analysis that does not comply with the requirements of Section 101(a) of the Clean Water Act, Federal Regulations 40 CFR § 131.12, the State Board's Antidegradation Policy (Resolution 68-16) and California Water Code (CWC) Sections 13146 and 13247.**

CWC Sections 13146 and 13247 require that the Board in carrying out activities which affect water quality shall comply with state policy for water quality control unless otherwise directed by statute, in which case they shall indicate to the State Board in writing their authority for not complying with such policy. The State Board has adopted the Antidegradation Policy (Resolution 68-16), which the Regional Board has incorporated into its Basin Plan. The Regional Board is required by the CWC to comply with the Antidegradation Policy.

Section 101(a) of the Clean Water Act (CWA), the basis for the antidegradation policy, states that the objective of the Act is to "restore and maintain the chemical, biological and physical integrity of the nation's waters." Section 303(d)(4) of the CWA carries this further, referring explicitly to the need for states to satisfy the antidegradation regulations at 40 CFR § 131.12 before taking action to lower water quality. These regulations (40 CFR § 131.12(a)) describe the federal antidegradation policy and dictate that states must adopt both a policy at least as stringent as the federal policy as well as implementing procedures.

California's antidegradation policy is composed of both the federal antidegradation policy and the State Board's Resolution 68-16 (State Water Resources Control Board, Water Quality Order 86-17, p. 20 (1986) ("Order 86-17"); Memorandum from Chief Counsel William Attwater, SWRCB to Regional Board Executive Officers, "federal Antidegradation Policy," pp. 2, 18 (Oct. 7, 1987) ("State Antidegradation Guidance")). As a state policy, with inclusion in the Water Quality Control Plan (Basin Plan), the antidegradation policy is binding on all of the Regional Boards (Water Quality Order 86-17, pp. 17-18).

Implementation of the state's antidegradation policy is guided by the State Antidegradation Guidance, SWRCB Administrative Procedures Update 90-004, 2 July 1990 ("APU 90-004") and USEPA Region IX, "Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12" (3 June 1987) ("Region IX Guidance"), as well as Water Quality Order 86-17.

The Regional Board must apply the antidegradation policy whenever it takes an action that will lower water quality (State Antidegradation Guidance, pp. 3, 5, 18, and Region IX Guidance, p. 1). Application of the policy does not depend on whether the action will actually impair



beneficial uses (State Antidegradation Guidance, p. 6). Actions that trigger use of the antidegradation policy include issuance, re-issuance, and modification of NPDES and Section 404 permits and waste discharge requirements, waiver of waste discharge requirements, issuance of variances, relocation of discharges, issuance of cleanup and abatement orders, increases in discharges due to industrial production and/or municipal growth and/or other sources, exceptions from otherwise applicable water quality objectives, etc. (State Antidegradation Guidance, pp. 7-10, Region IX Guidance, pp. 2-3). Both the state and federal policies apply to point and nonpoint source pollution (State Antidegradation Guidance p. 6, Region IX Guidance, p. 4).

The federal antidegradation regulations delineate three tiers of protection for waterbodies. Tier 1, described in 40 CFR § 131.12(a)(1), is the floor for protection of all waters of the United States (48 Fed. Reg. 51400, 51403 (8 Nov. 1983); Region IX Guidance, pp. 1-2; APU 90-004, pp. 11-12). It states that “[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.” Uses are “existing” if they were actually attained in the water body on or after November 28, 1975, or if the water quality is suitable to allow the use to occur, regardless of whether the use was actually designated (40 CFR § 131.3(e)). Tier 1 protections apply even to those waters already impacted by pollution and identified as impaired. In other words, already impaired waters cannot be further impaired.

Tier 2 waters are provided additional protections against unnecessary degradation in places where the levels of water quality are better than necessary to support existing uses. Tier 2 protections strictly prohibit degradation unless the state finds that a degrading activity is: 1) necessary to accommodate important economic or social development in the area, 2) water quality is adequate to protect and maintain existing beneficial uses and 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved (40 CFR § 131.12(a) (2)). Cost savings to a discharger alone, absent a demonstration by the project proponent as to how these savings are “necessary to accommodate important economic or social development in the area,” are not adequate justification for allowing reductions in water quality (Water Quality Order 86-17, p. 22; State Antidegradation Guidance, p. 13). If the waterbody passes this test and the degradation is allowed, degradation must not impair existing uses of the waterbody (48 Fed. Reg. 51403). Virtually all waterbodies in California may be Tier 2 waters since the state, like most states, applies the antidegradation policy on a parameter-by-parameter basis, rather than on a waterbody basis (APU 90-004, p. 4). Consequently, a request to discharge a particular chemical to a river, whose level of that chemical was better than the state standards, would trigger a Tier 2 antidegradation review even if the river was already impaired by other chemicals.

Tier 3 of the federal antidegradation policy states “[w]here high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water shall be maintained and protected (40 CFR § 131.12(a)(3)). These Outstanding National Resource Waters (ONRW) are designated either because of their high quality or because they are important for another reason (48 Fed. Reg. 51403; State Antidegradation Guidance, p. 15). No degradation of water quality is allowed in these waters other than short-term, temporary changes (Id.). Accordingly, no new or increased discharges are allowed in either ONRW or tributaries to ONRW that would result in lower water quality in the ONRW (EPA Handbook, p. 4-10; State Antidegradation Guidance, p.



15). Existing antidegradation policy already dictates that if a waterbody “should be” an ONRW, or “if it can be argued that the waterbody in question deserves the same treatment [as a formally designated ONRW],” then it must be treated as such, regardless of formal designation (State Antidegradation Guidance, pp. 15-16; APU 90-004, p. 4). Thus the Regional Board is required in each antidegradation analysis to consider whether the waterbody at issue should be treated as an ONRW. It should be reiterated that waters cannot be excluded from consideration as an ONRW simply because they are already “impaired” by some constituents. By definition, waters may be “outstanding” not only because of pristine quality, but also because of recreational significance, ecological significance or other reasons (40 CFR §131.12(a)(3)). Waters need not be “high quality” for every parameter to be an ONRW (APU 90-004, p. 4). For example, Lake Tahoe is on the 303(d) list due to sediments/siltation and nutrients, and Mono Lake is listed for salinity/TDC/chlorides but both are listed as ONRW.

Even a minimal antidegradation analysis requires an examination of: 1) existing applicable water quality standards; 2) ambient conditions in receiving waters compared to standards; 3) incremental changes in constituent loading, both concentration and mass; 4) treatability; 5) best practicable treatment and control (BPTC); 6) comparison of the proposed increased loadings relative to other sources; 7) an assessment of the significance of changes in ambient water quality and 8) whether the waterbody was a ONRW. A minimal antidegradation analysis must also analyze whether: 1) such degradation is consistent with the maximum benefit to the people of the state; 2) the activity is necessary to accommodate important economic or social development in the area; 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved; and 4) resulting water quality is adequate to protect and maintain existing beneficial uses. A BPTC technology analysis must be done on an individual constituent basis; while tertiary treatment may provide BPTC for pathogens, dissolved metals may simply pass through.

Any antidegradation analysis must comport with implementation requirements in State Board Water Quality Order 86-17, State Antidegradation Guidance, APU 90-004 and Region IX Guidance.

The antidegradation review process is especially important in the context of waters protected by Tier 2. See EPA, Office of Water Quality Regulations and Standards, *Water Quality Standards Handbook*, 2nd ed. Chapter 4 (2nd ed. Aug. 1994). Whenever a person proposes an activity that may degrade a water protected by Tier 2, the antidegradation regulation requires a state to: (1) determine whether the degradation is “necessary to accommodate important economic or social development in the area in which the waters are located”; (2) consider less-degrading alternatives; (3) ensure that the best available pollution control measures are used to limit degradation; and (4) guarantee that, if water quality is lowered, existing uses will be fully protected. 40 CFR § 131.12(a)(2); EPA, Office of Water Quality Regulations and Standards, *Water Quality Standards Handbook*, 2nd ed. 4-1, 4-7 (2nd ed. Aug. 1994). These activity-specific determinations necessarily require that each activity be considered individually.

For example, the APU 90-004 states:



“Factors that should be considered when determining whether the discharge is necessary to accommodate social or economic development and is consistent with maximum public benefit include: a) past, present, and probably beneficial uses of the water, b) economic and social costs, tangible and intangible, of the proposed discharge compared to benefits. The economic impacts to be considered are those incurred in order to maintain existing water quality. The financial impact analysis should focus on the ability of the facility to pay for the necessary treatment. The ability to pay depends on the facility’s source of funds. In addition to demonstrating a financial impact on the publicly – or privately – owned facility, the analysis must show a significant adverse impact on the community. The long-term and short-term socioeconomic impacts of maintaining existing water quality must be considered. Examples of social and economic parameters that could be affected are employment, housing, community services, income, tax revenues and land value. To accurately assess the impact of the proposed project, the projected baseline socioeconomic profile of the affected community without the project should be compared to the projected profile with the project...EPA’s Water Quality Standards Handbook (Chapter 5) provides additional guidance in assessing financial and socioeconomic impacts”

As a rule-of-thumb, USEPA recommends that the cost of compliance should not be considered excessive until it consumes more than 2% of disposable household income in the region. This threshold is meant to suggest more of a floor than a ceiling when evaluating economic impact. In the Water Quality Standards Handbook, USEPA interprets the phrase “necessary to accommodate important economic or social development” with the phrase “substantial and widespread economic and social impact.”

The antidegradation analysis must discuss the relative economic burden as an aggregate impact across the entire region using macroeconomics. Considering the intrinsic value of the Delta to the entire state and the potential effects upon those who rely and use Delta waters, it must also evaluate the economic and social impacts to water supply, recreation, fisheries, etc. from the Discharger’s degradation of water quality in the Delta. Nor has the case been made that there is no alternative for necessary housing other than placing it where its wastewater must discharge directly into sensitive but seriously degraded waters. It is unfortunate that the agency charged with implementing the Clean Water Act has apparently decided it is more important to protect the polluter than the environment.

There is nothing resembling an analysis buttressing the unsupported claim that BPTC is being provided. An increasing number of wastewater treatment plants around the country and state are employing reverse-osmosis (RO), or even RO-plus. Clearly, micro or nano filtration can be considered BPTC for wastewater discharges of impairing pollutants into critically sensitive ecological areas containing listed species that are already suffering serious degradation. If this is not the case, the antidegradation analysis must explicitly detail how and why a run-of-the-mill secondary or tertiary system can be considered BPTC.

Any reasonably adequate antidegradation analysis must discuss the affected beneficial uses (i.e., numbers and health of the aquatic ecosystem; extent, composition and viability of agricultural



production; people depending upon these waters for water supply; extent of recreational activity; etc.) and the probable effect the discharge will have on these uses.

Alternatively, Tier 1 requires that existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. By definition, any increase in the discharge of impairing pollutants to impaired waterways unreasonably degrades beneficial uses and exceeds applicable water quality standards. Prohibition of additional mass loading of impairing pollutants is a necessary stabilization precursor to any successful effort in bringing an impaired waterbody into compliance.

The proposed Permit allows a mixing zone for constituents based on human health (Drinking water) rather than requiring treatment to meet end-of-pipe limitations. The Delta serves to convey the drinking water supply for over 25 million Californians via the State Water Project (SWP), Central Valley Project (CVP) and local projects and intakes. Through the SWP and CVP, the channels in the Delta are also used to supply the agricultural water supply for roughly 2 million acres of prime farmland. It is important to stress that the Delta is not the source per se for all SWP and CVP water, but that the Delta and the Sacramento River serve as a critical conduit for water supplies that are physically developed upstream. To comply with the Antidegradation Policy, the trade of receiving water beneficial uses for lower utility rates must be in the best interest of the people of the state and must also pass the test that the Discharger is providing BPTC. Although the use of mixing zones may lead to individual, short-term cost savings for the discharger, significant long-term health and economic costs may be placed on the rest of society. The required antidegradation finding, that allowing a mixing zone rather than requiring treatment to remove pollutants to levels that protect beneficial uses at the point of discharge, is in the best interest of the people of California can be made in good faith. It is doubtful that put to a vote that Californians would vote to allow drinking water to be incrementally degraded in favor of maintenance of Sacramento's low sewer rates. Californians have routinely voted for clean water and clean water bonds. An assessment of BPTC, and therefore compliance with the Antidegradation Policy, must assess whether treatment of the wastestream can be accomplished, is feasible, and not simply the additional costs of compliance with water quality standards. A BPTC case can be made for the benefits of prohibiting a mixing zone and requiring technologies that provide superior waste treatment and reuse of the wastestream. It is more likely that the allowance for a human health mixing zone may be considered a violation of the State Constitution which requires the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the mixing zone is a waste and unreasonable use of water which is not in the interest of the people and for the public welfare.

The Sacramento River is impaired and 303(d) listed for unknown toxicity. The proposed Permit allows a mixing zone for chronic toxicity. Already impaired waters cannot be further impaired. The Antidegradation Policy discussion in the proposed Permit or as prepared by the Discharger, does not discuss the impacts of allowing further degradation of the Sacramento River and the impacts of allowing a toxic mixing zone in an already impaired waterbody.

The proposed permit, Page F-73, states that: "...in addition, there are at least 20 agricultural diversions within 1 mile upstream and 2 miles downstream of the discharge." The mixing zone has not been defined for salinity. The size of the mixing zone has not been defined. It is reasonable to assume that since there are numerous irrigation intakes within 1 to 2 miles of the



discharge that the intakes would be impacted by inadequately diluted wastewater containing EC above the agricultural goal. The proposed mixing zone for salinity has not met any of the requirements in the SIP or the Basin Plan. The allowance for a mixing zone for salinity and the impacts to the agricultural beneficial use is not discussed in the Antidegradation Policy analysis.

The Proposed Permit shows based on the instream ambient hardness, that copper, lead and zinc are present in the discharge at elevated concentrations. The combination of copper, lead and zinc has a potential for exhibiting additive toxic effects. The Basin Plan, *Implementation, Policy for Application of Water Quality Objectives* requires that: “Where multiple toxic pollutants exist together in water, the potential for toxicologic interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and effluent data to determine whether there is a reasonable potential for interactive toxicity. Pollutants which are carcinogens or which manifest their toxic effects on the same organ systems or through similar mechanisms will generally be considered to have potentially additive toxicity.” The Antidegradation Policy assessment does not address additive toxicity.

Table 3-2 of the Discharger’s Antidegradation Analysis lists “applicable Water Quality Objectives and/or Criteria for the Sacramento-San Joaquin Delta.

Table 3-2 fails to cite that

- BOS and total suspended solids (TSS) limitations are based on the Federal Secondary Treatment Rule.
- Chlorine residual levels are based on the narrative toxicity objective.
- The EC objective: The designated beneficial uses of irrigated agriculture and industrial supply are not protected by the sole application of the secondary MCL.
- The TDS objective: The designated beneficial uses of irrigated agriculture and industrial supply are not protected by the sole application of the secondary MCL.
- The aluminum objective: chronic aquatic life beneficial uses are not listed as being more stringent than the cited secondary MCL
- The metals criteria for copper, lead, nickel, silver and zinc are: based on “A range of receiving water criteria was calculated using downstream 5th percentile (39.9 mg/L) and 95th percentile (84.2 mg/L) hardness values for the Sacramento River at River Mile 44 collected during the period 1/22/1998 – 6/12/2008.” ((table 3-2) footnote No. 4) Federal Regulation 40 CFR 131.38(c)(4) states that: “For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations.” . Ambient conditions are in-stream conditions unimpacted by the discharge. Confirming this definition, the SIP Sections 1.4.3.1 *Ambient Background Concentration as an Observed Maximum* and 1.4.3.2 state in part that: “If possible, preference should be given to ambient water column concentrations measured immediately upstream or near the discharge, but not within an allowed mixing zone for the discharge. The “antidegradation analysis fails to cite the lowest recorded upstream hardness value which should have been utilized in determining the water quality standards for metals. On January 6<sup>th</sup> 2007 the total hardness (CaCO<sub>3</sub>) was measured in the Sacramento River at Freeport at 19 mg/l.



(USGS Water-Quality Assessment of the Sacramento River Basin, California: Water-Quality, Sediment and Tissue Chemistry, and Biological Data, 1995-1998 (Open-File Report) 2000-391, [http://ca.water.usgs.gov/sac\\_nawqa/Publications/ofr\\_2000-391/data\\_sw\\_int.html](http://ca.water.usgs.gov/sac_nawqa/Publications/ofr_2000-391/data_sw_int.html))

- Chloroform: a citation of the Cal EPA Cancer Potency Factor as a Drinking Water Level of 1.1 ug/l is absent. Only the total trihalomethane MCL of 80 ug/l is cited.

Page 3-2 (60) “The range of hardness-based acute and chronic freshwater aquatic life CTR objectives for dissolved copper, lead, silver and zinc included in Table 3-2 were calculated using 5th and 95th percentile downstream hardness values calculated for the Sacramento River at River Mile 44” not the lowest observed ambient receiving water of 19 mg/l.

Section 3.3 303(D) listings (page 3-6 (64) The Sacramento-San Joaquin Delta is impaired for chlorpyrifos, DDT, diazinon, exotic species, group A pesticides, mercury and unknown toxicity. Portions of the Delta are also 303(D) listed for electrical conductivity (EC). The analysis (page 3-8, 66) acknowledges that the sources of unknown toxicity are unknown and that any proposed TMDL completion is not scheduled to be completed until 2019.

Although the proposed Permit is based on no expanded flow rate, under the Clean Water Act and the NPDES permit regulations (40 CFR 122.4(i)), when a new source seeks to obtain a permit for a discharge of pollutants to a stream segment already exceeding its water quality standards for that pollutant, no permit may be issued. An exception to this prohibition is where the new source demonstrates, before the close of the public comment period for the proposed permit, that: (1) there are sufficient remaining pollutant load allocations for the discharge, and (2) existing dischargers in the stream segment are subject to compliance schedules designed to bring the stream segment into compliance with applicable water quality standards. The Ninth Circuit Court of Appeals has ruled in *Friends of Pinto Creek v. United States Environmental Protection Agency* that a new or expanded wastewater discharge may not be allowed into an impaired waterway unless all existing discharges have been identified and are subject to compliance schedules.

The Discharger’s Antidegradation Analysis, Section 4 Environmental Setting (page 4-1, 72), Section 4.4 on pages 4-6 and 4-7, compares the Sacramento Regional wastewater discharge to “similarly situated discharges”.

The discussion of “similarly situated dischargers” states that: “...advanced treatment is often driven by low dilution of treated effluent that occurs in the receiving water, such as is typically the case for many Central Valley dischargers. The SRWTP discharge situation is rare among wastewater treatment plants within the region in that its receiving water – the Sacramento River at Freeport – currently provides a daily average dilution ratio of 20:1 or more at all times, and is expected to do so greater than 99.5% of the time under the proposed 218 mgd discharge scenario. Additionally, modeling performed for the 70-year (1922-1991) hydrologic period of record shows that the mean percentage of flow contributed by SRWTP discharge to the twelve Delta locations modeled for percent SRWTP effluent contribution as a result of the proposed project, would range from 0.01% at in the San Joaquin River near Stockton to 2.2% at in the Sacramento



River Greene's Landing/Hood, indicating typical dilution ratios ranging from approximately 50:1 to 1000:1.

All of the communities in the Central Valley with existing discharges that have constructed or are constructing advanced treatment facilities have done so in reaction to water quality-based considerations influenced by the location and physical conditions that exist at their point of discharge to receiving waters. For communities that have established new discharges to receiving waters, applicable NPDES discharge requirements have resulted in the need to construct advanced treatment facilities to be able to achieve permit requirements upon commencement of the discharge. Examples of such new discharges include Iron House Sanitary District and the City of Rio Vista. In such cases, the dilution characteristics in the receiving water have not been a controlling factor in the decision to construct advanced treatment facilities. Because the dilution situation for the SRWTP discharge is distinctly different from most other municipal discharges within the region, many of which occur in effluent dominated water bodies, so too are the water quality-based factors that relate to the level of treatment required to comply with applicable standards and to protect downstream beneficial uses. This important factor of dilution was accounted for in the water quality modeling performed in support of the District's Master Plan EIR, and was considered in this assessment. The water quality analysis provided in this antidegradation analysis, together with the assessment performed as part of the NPDES permit renewal, will be used to reach decisions regarding the future level of treatment required at the SRWTP, in accordance with the rules and policies existing under the Clean Water Act and California Water Code."

The discussion of "similarly situated dischargers" fails to consider or discuss that:

1. Dilution in a receiving stream may be granted only if assimilative capacity exists within a receiving stream. The use of assimilative capacity is based on a mixing zone analysis. Mixing zones are limited areas where water quality standards are allowed to be exceeded within a receiving stream. The granting of a mixing zone allows a wastewater Discharger to utilize the receiving stream to dilute wastewater constituents within the receiving stream rather than provide the treatment necessary to remove pollutants. Dilution is not based solely on hydraulic flow rates as is presented, but is also dependant on individual constituent concentrations. There is no discussion of pollutant concentrations, assimilative capacity of individual pollutants or the impacts of a mixing zone analysis on the beneficial uses of the receiving stream, the Sacramento River.
2. The significance of a twenty-to-one dilution ratio is not discussed but is based on recommendations from the California Department of Public Health (DPH) to protect the beneficial uses of contact recreation and food crop irrigation. The DPH recommendation is presented in their *Wastewater Disinfection for Public Health Protection*, February 1987, and the *Uniform Guidelines for the Disinfection of Wastewater*, August 1992. The science utilized by DPH in developing these documents was also utilized to develop *Reclamation Criteria* contained in California Code of Regulations Title 22. The DPH documents recommend that a tertiary level of treatment is necessary to protect contact recreational uses in an unrestricted impoundment and to directly irrigate food crops. DPH recommends that secondary treatment plus a minimum in stream dilution ratio of



twenty-to-one offers an equivalent level of protection as tertiary treatment. Contact recreation and irrigated agriculture are beneficial uses of the Sacramento River at the point of discharge. These beneficial uses would not be protected within a granted mixing zone.

3. The DPH recommended twenty-to-one dilution were not based on surface waters receiving significant upstream wastewater discharges. The Sacramento River and the Delta, upstream of the Sacramento Regional Wastewater Treatment Plant, receive significant flows from other wastewater discharges. The quantity and quality of the upstream wastewater discharges is not discussed, particularly from Placer and Nevada County and the City of Sacramento combined sewer overflows. DPH has not made any recommendations with regard to surface water and an acceptable level of treatment or dilution when the receiving stream already contains significant treated sewage.
4. The State and Regional Board's Antidegradation Policy, Resolution 68-16, requires the application of best practicable treatment and control (BPTC) of wastewater discharges. The large number of wastewater treatment plants providing advanced (tertiary treatment and nitrification/denitrification) surrounding the Sacramento Regional wastewater treatment plant establishes a standard of BPTC. The establishment of BPTC has not been discussed with regard to the large number of wastewater treatment plants providing advanced treatment.

The Discharger's Antidegradation Policy analysis, Section 4.5.1 Pelagic Organisms Decline (page 4-8, 79). This Section states in part that: "Since 2000, the population levels of several pelagic fish species in the Delta have experienced a precipitous decline to historic low levels that continues to persist. The species in question include Delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), threadfin shad (*Dorosoma petenense*), and juvenile striped bass (*Morone saxatilis*). The potential causes or contributors of the above described Pelagic Organism Decline (POD) which are under investigation include: (1) hydrologic modifications associated with Delta water supply projects, (2) entrainment of fish species and prey species in Delta pumps and pump intake facilities, (3) food web disruption caused by invasive clam and aquatic plant species, (4) predation by native and non-native species, (5) adverse impacts of contaminants, including pesticides, ammonia, trace metals, and other constituents of concern, (6) habitat quality decline, (7) stock-recruitment effects and (8) other factors. The impact valuations contained in Section 5 identify the magnitude of change in water quality associated with the proposed increase in discharge. Additionally, potential impacts related to the toxicity of the most sensitive aquatic species in national data sets are assessed through the use of U.S. EPA criteria and adopted water quality standards contained in the California Toxics Rule and National Toxics Rule. Additional pertinent information is also considered in the impact evaluations, where available."

The water quality evaluation contained in the Antidegradation Analysis, including Section 5, do not include an evaluation of additive toxicity as is required by the Basin Plan. The Basin Plan, *Implementation, Policy for Application of Water Quality Objectives* requires that: "Where multiple toxic pollutants exist together in water, the potential for toxicologic interactions exists. On a case by case basis, the Regional Water Board will evaluate available receiving water and



effluent data to determine whether there is a reasonable potential for interactive toxicity. Pollutants which are carcinogens or which manifest their toxic effects on the same organ systems or through similar mechanisms will generally be considered to have potentially additive toxicity.”

The water quality evaluation contained in the Antidegradation Analysis, including Section 5, do not include an evaluation of “emerging constituents of concern”. There are thousands of chemicals and chemical compounds in use throughout modern communities. Only approximately two hundred have had water quality standards developed. Scientific studies are revealing that these emerging constituents are responsible for the feminization of fish and numerous other impacts which could result in their decline in surface waters. Studies have revealed that these constituents pass through current wastewater treatment systems, *Source, Fate, and Transport of Endocrine Disruptors, Pharmaceuticals, and Personal Care Products in Drinking Water Sources in California National Water Research Institute Fountain Valley, California, May 2010*. Expansion of the Sacramento Regional Wastewater Treatment Plant will result in the discharge of “emerging constituents” at increased levels. If these studies are true; the wastewater discharge would violate the Receiving Water Limitation for toxicity which requires that a wastewater discharge shall not cause “toxic substances to be present, individually or in combination, in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.” While this section of the Antidegradation Analysis discusses aquatic life, the impacts to drinking water and human health must also be considered with regard to emerging constituents.

The proposed Permit, page F-75, states that: *“Given the very high level of public contact with the receiving water, the use of the receiving water for irrigation which can result in human contact with pathogens, and extensive use of Delta waters as private and public water supplies, any increased risk of illness and infection from exposure to the wastewater is not protective of the municipal, agricultural or recreational beneficial use. This permit requires an essentially pathogen free wastewater, which will incidentally implement DPH’s recommendation to improve the level of disinfection to remove protozoa in addition to bacteria, enteric virus and other pathogens. Several technologies are available to achieve this, all essentially involving filtration to produce a very low-solids effluent, which is then dosed with a disinfectant (usually chlorine or UV light). The combination of filtration and disinfectant effectively removes all pathogens. Requirements of Title 22 will be adequate to meet the 1 in 10,000 risk and 1 log removal recommended by the DPH.”* The proposed permit acknowledges that 1986 USEPA’s Ambient Criteria for bacteria is based on risk criteria of 8 illnesses in 1,000 exposures. EPA’s ambient criteria for bacteria is the basis for the current and past Receiving Water Limitation for coliform organisms and is the level argued by the Discharger as being protective of water quality. The proposed Permit acknowledges that the receiving stream at the point of discharge is heavily used for contact recreation. The Antidegradation Analysis does not assess how many illness have occurred during the existing life of the wastewater discharge and how many will occur in the recommended compliance period (another 10-years) until “tertiary” treatment will be established. The Antidegradation Analysis does not discuss the costs associated with the past, existing and future illnesses cause from recreational activity within the wastewater plume.



The proposed Permit contains Effluent Limitations for ammonia based on preventing toxicity to aquatic life based on EPA's ambient criteria. The proposed Permit clearly shows that the wastewater discharge from the Sacramento Regional Wastewater Treatment plant is toxic to aquatic life. The Sacramento River, within the Sacramento River delta is home to numerous endangered and threatened species. Within the 10 years the Regional Board is proposing to allow Sacramento Regional County Sanitation District to eliminate the toxic discharges, the impact to threatened and endangered species will be devastating to a waterbody already in significant decline. The Antidegradation Analysis should acknowledge the impacts to endangered and threatened species during the 10-years the Regional Board is allowing for Sacramento County to eliminate their toxic discharges to the Sacramento River.

The proposed Permit fails to cite any of the exceptions to Federal regulations 40 CFR 122.44 (l)(1) in relaxing the permit and removing limitations. The removal of limitations rests solely on continued monitoring, not new information as defined in the regulation. There was no substantial modification to the treatment system or the character of the wastestream that justifies removal of the limitations. With regard to silver, lead and zinc, contrary to the statements regarding "new" information, the removal of limitations was based on the use of the effluent, rather than the ambient instream hardness, in determining reasonable potential that resulted in the Regional Board's removal of the limitations. The statement that "any impact on existing water quality will be insignificant" is incorrect if the removal of metal limitations results in toxicity during periods of low ambient hardness. Removal of the Effluent Limitations for silver, lead and zinc and use of the effluent hardness rather than the lowest observed ambient hardness is not discussed in the Antidegradation Analysis.

**23. The proposed Permit does not contain enforceable Effluent Limitations for chronic toxicity and therefore does not comply with the Basin Plan, Federal Regulations, at 40 CFR 122.44 (d)(1)(i) and the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP).**

Proposed Permit, State Implementation Policy states that on March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP, Section 4, Toxicity Control Provisions, Water Quality-Based Toxicity Control, states that: "A chronic toxicity effluent limitation is required in permits for all dischargers that will cause, have a reasonable potential to cause, or contribute to chronic toxicity in receiving waters." The SIP is a state *Policy* and CWC Sections 13146 and 13247 require that the Board in carrying out activities which affect water quality shall comply with state policy for water quality control unless otherwise directed by statute, in which case they shall indicate to the State Board in writing their authority for not complying with such policy.

Federal regulations, at 40 CFR 122.44 (d)(1)(i), require that limitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, or contribute to an excursion above any State water quality standard, including state narrative criteria for water quality. There has been no argument that domestic sewage contains toxic substances and presents a reasonable potential to cause toxicity if not properly treated and discharged. The Water Quality Control Plan for the Sacramento/ San



Joaquin River Basins (Basin Plan), Water Quality Objectives (Page III-8.00) for Toxicity is a narrative criteria which states that all waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. The Proposed Permit contains a narrative Effluent Limitation prohibiting the discharge of chronically toxic substances; however a *Compliance Determination* has been added to the proposed Permit that sampling and TRE/TIE provisions of Provision shall constitute compliance with effluent limitation. The *Compliance Determination* nullifies the Effluent Limitation and makes toxic discharges unenforceable.

The Basin Plan narrative Toxicity Objective states that: “All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Board.”

According to the Basin Plan toxicity sampling is required to determine compliance with the requirement that all waters be maintained free of toxic substances. Sampling does not equate with or ensure that waters are free of toxic substances. The Tentative Permit requires the Discharger to conduct an investigation of the possible sources of toxicity if a threshold is exceeded. This language is not a limitation and essentially eviscerates the Regional Board’s authority, and the authority granted to third parties under the Clean Water Act, to find the Discharger in violation for discharging chronically toxic constituents. An enforceable effluent limitation for chronic toxicity must be included in the Order.

**24. It is improper to rely upon linked proprietary models that have not been peer-reviewed and that cannot be independently calibrated and verified.**

Models are complex simulations that, at their best, only represent an idealization of actual field conditions. They must be used with extreme caution to ensure that the underlying model assumptions hold for the site-specific situations being modeled. Subtle changes in coefficients, assumptions or input data can dramatically alter output. It is crucial that models be properly calibrated and verified. Since models only represent an idealization of reality, they’re generally better at comparative analyses than absolute analysis: i.e., they’re better able to produce a reasonably reliable estimate of the relative change in outcome than generate a reliable absolute prediction. Unfortunately, defining a specific point where a constituent will comply with a numerical water quality standard requires a reliable prediction.

Sacramento Regional submitted a complex set of linked models to the Regional Board as part of its request for a renewed NPDES permit. These linked models rely sequentially upon the output of the previous model, which introduces and magnifies potential error. Many of the components of these models are proprietary and have never been subject to independent peer review. The Regional Board does not have staff capable of running or verifying models.



The Board tasked Tetra Tech to review the dynamic modeling study. However, Tetra Tech was not supplied copies of the model and could not independently run or verify them. Their review was based upon a series of questions and answers between the Regional Board and Sacramento Regional. The Tetra Tech review does show that component models were developed to account for a shortcoming in the previous model. For example, Tetra Tech's review memorandum to the Regional Board states, "[a]s noted in the preceding section, the FDM's water quality component could have been used to simulate upstream effluent transport during reverse flow events at the expense of having to highly refine its spatial resolution in the vicinity of the diffuser. The LDM was implemented as an alternative to refinement of the FDM." Review of the Sacramento Regional County Sanitation District's Dynamic Modeling Study for the Sacramento Regional Wastewater Treatment Plant, Final Memorandum, June 30, 2008, p. 5. The review also shows that attempts to validate and calibrate the models were done using instream dye studies. Tetra Tech states, "[s]ome phenomena were observed in the field that were not reproduced in the model, most notably a region of high dye concentration near the eastern river bank just downstream from the diffuser in the October 2005 dye release. The subsequent November 2006 dye release was conducted in an effort to further resolve this observed behavior, however the model failed in all cases to reproduce this high concentration region." *Id.* p. 9-10. In other words, the model failed to predict high constituent concentrations along the eastern bank of the outside bend of the Sacramento River. This is the location of the "defined" zone of passage or fish bypass where outmigrating juvenile salmon would be present. The dye test conclusively shows that there is no bypass for fish as claimed by Sacramento Regional.

The Regional Board has previously voted not to accept the results of proprietary models that cannot be independently calibrated and verified. Indeed, the Regional Board rejected using the proprietary non-verified modeling submitted by Sacramento Regional during issuance of its previous NPDES permit. It should reject this latest submittal of an even more complex and unverifiable set of models and insist that Sacramento Regional verify its modeling by actual pollutant sampling for individual constituents, as CSPA recommended in 2000.

**25. Comments on tentative NPDES permitting options** (Discussed in significant detail throughout the above comments)

**I. Dilution and Mixing Zones** Dilution Alternative 1 - no dilution granted. This alternative does not allow any mixing zones, so all water quality criteria must be met at the "end of the pipe." This alternative is the only alternative that is fully protective of the beneficial uses of the receiving stream. The other alternatives are critically flawed as discussed in detail in our comments regarding mixing zones above.

**II. Disinfection**

Filtration and increased disinfection is required to protect the contact recreation beneficial use of the receiving stream and to provide best practicable treatment and control (BPTC) of the discharge. Secondary disinfected wastewater is not fit for contact recreation uses as confirmed by comparison to the unrestricted recreational requirements contained in CCR Title 22. While Title 22 is not applicable to wastewater discharges; the science generated in developing Title 22 requirements is applicable and critical in protecting the public health. The Sacramento River has a designated beneficial use of



contact recreation and is characterized as heavy contact recreational use at the wastewater point of discharge. An illness rate of 8 swimmers out of each 1,000, the rate established in the bacteria criteria, is an unacceptable risk to those using the Sacramento River for recreation. The conversion of most local wastewater treatment plants to filtration establishes BPTC in accordance with the Antidegradation Policy and is applicable to this discharge.

### **III. Ammonia (and Nitrate) Removal**

Federal regulation requires development of an Effluent Limitation if the wastewater discharge presents a reasonable potential to exceed a water quality objective. In this case the water quality objective is the Basin Plan narrative toxicity objective. According to EPA's ambient criteria for the protection of fresh water aquatic life the discharge is toxic at the current level for ammonia. Nitrification and denitrification are BPTC based on the large number of local wastewater treatment plants providing such. Nitrate removal must be conducted once ammonia is converted to nitrate. Nitrate removal must be implemented to protect the drinking water beneficial use, to prevent biostimulation and to provide BPTC.

#### **26. There are a number of inaccuracies and deficiencies in the monitoring program.**

The proposed Permit, Monitoring and Reporting Program, Table E3a, lists conflicting effluent monitoring for temperature.

Effluent temperature monitoring is listed twice in Table E3a, one as continuous monitoring and once as a daily grab sample. The sampling for temperature should be continuous.

The proposed Permit, Monitoring and Reporting Program, allows for ammonia, a toxic constituent, to be removed prior to laboratory analysis.

The Monitoring and Reporting program allows that the acute toxicity testing may be modified to eliminate ammonia-related toxicity until **30 November 2020**, at which time the Discharger shall be required to implement the test without modifications to eliminate ammonia toxicity.

Ammonia is a toxic constituent. The currently available public documents do not detail whether ammonia was removed prior to analysis. The compliance summary is questionable as to whether there would have been additional reported toxicity based on the presence of ammonia. Toxicity and ammonia are also established as effluent Limitations subject to appropriate enforcement action and third party lawsuits. The removal of ammonia prior to laboratory analysis will mask the fact that the toxicity and ammonia limitations had been violated.

The proposed Monitoring and Reporting Program should be modified to establish receiving water sampling location at each and every end of mixing zone location, assuming that mixing zones are approved.

In conclusion, while CSPA welcomes the long overdue requirements to nitrify/de-nitrify and remove pathogens to tertiary standards, numerous provisions of the proposed Permit fall far short of complying with statutory and regulatory mandates governing the issuance of NPDES permits. The permit does not adequately protect a seriously degraded ecosystem. We urge the Regional



Board to revise the Permit and re-circulate one that complies with the law and protects the environment.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "Bill Jennings". The signature is fluid and cursive, with the first name "Bill" written in a larger, more prominent script than the last name "Jennings".

Bill Jennings, Executive Director  
California Sportfishing Protection Alliance